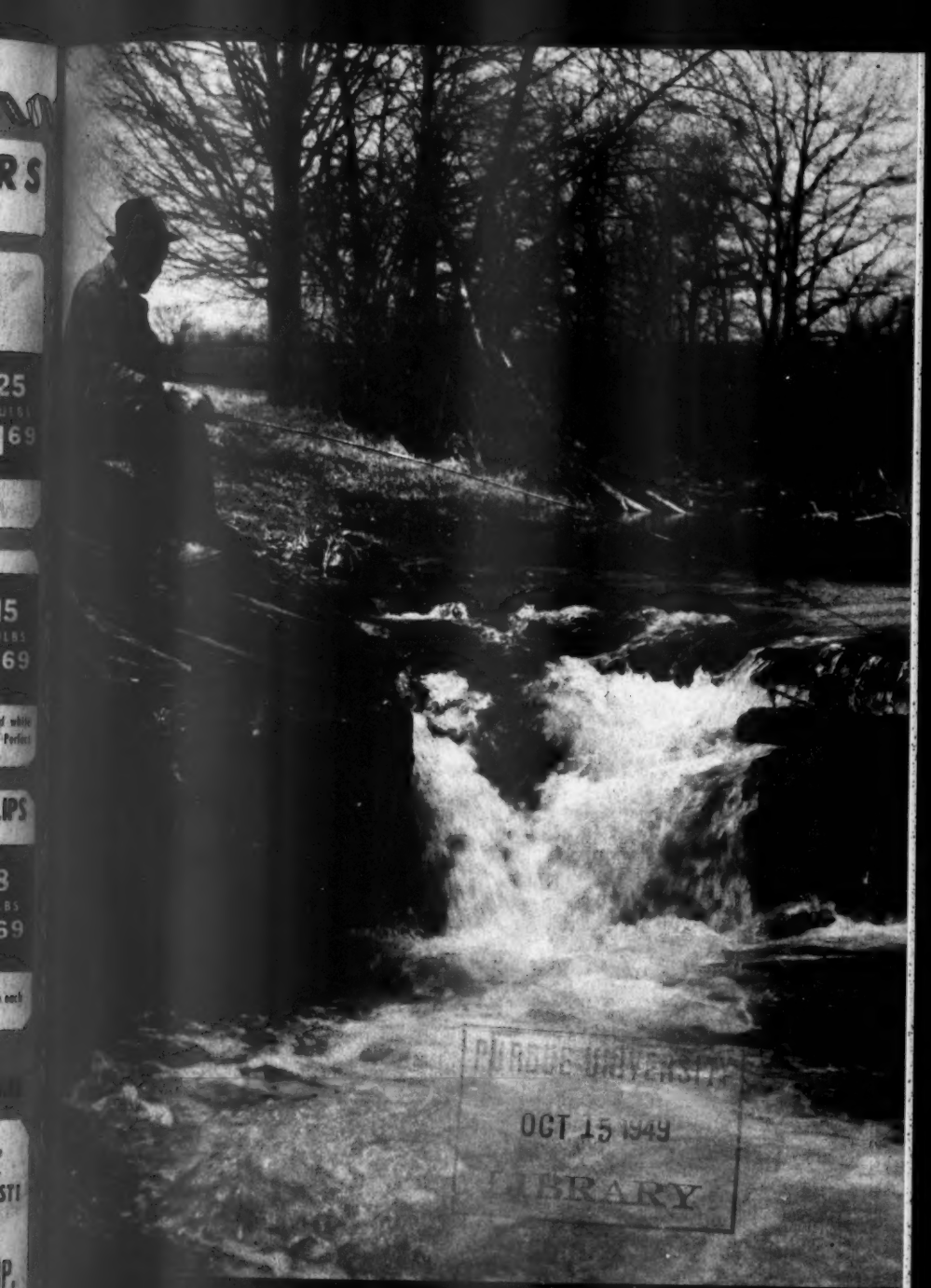

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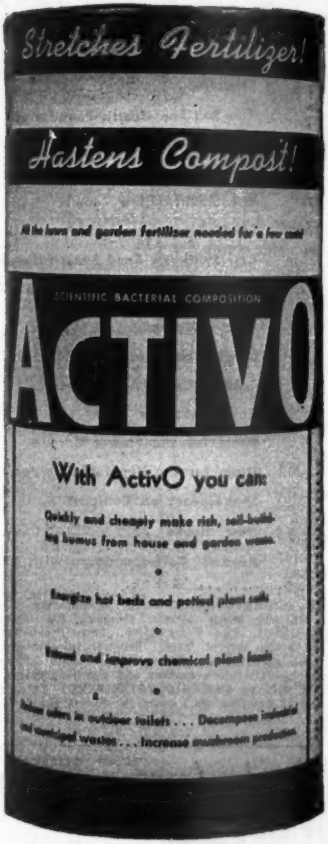
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Contents

VOLUME 15, NUMBER 4 OCTOBER 1949

THE ONLY MAGAZINE DEVOTED EXCLUSIVELY TO ORGANIC GARDENING

Organic Gardening

Editor and Publisher
J. I. RODALE

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The Forum 3
Editorial—Cancer, Part VI ..... J. I. Rodale 12
Miscellany ..... J. I. Rodale 15
The Soil and Health Foundation 18
How to Plant Bulbs ..... Dr. William H. Eyster 19
Lore of Our Native Witch-Hazel ..... G. L. Wittrock 23
The Small-Fruited Tomato ..... Archer D. Whallon 26
Small Experiment with Potatoes ..... S. W. Edwards 28
Can Synthetic Food Substitutes Solve our Food Problem? Eric Ewosen 30
Grinding Leaves ..... Robert M. Wason 35
Lilium Superbum ..... Edward Walshaw 36
Seminar on Insects ..... Dr. William H. Eyster 38
Garden Calendar—October 44
Root System of Beans ..... Dr. Paul Scott 47
Hints for the Flower Garden 49
Hints for the Vegetable Garden 50
Shakespeare on Compost ..... Sheila Pim 51
New Books 54
Readers' Correspondence with Dr. Wm. H. Eyster 56

ORGANIC CULTURE

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MULCHING STRAWBERRIES

Dear Sirs:

I would like to say a word more about mulching strawberries. Pine and fir needles is my favorite mulch but red fir sawdust is also very good where one does not irrigate in open ditches. Three inches of sawdust put around and between rows after they are well established will do wonders. This is used to best advantage for everbearers raised in the hill system. In matted rows the runner plants do not root readily in sawdust unless it is always moist on top which is impossible. With a sawdust mulch in your everbearing strawberries you can say goodbye to weeds, cultivation and hoeing for the season. Give it a try. It has worked wonders for a number of berry growers here. If anyone who reads this cares for any further hints on mulching, I will be glad to correspond with them.

Henry Johnson, Jr.
Rte. No. 1, Box 310, Ashland, Ore.

—o—

AN ORGANIC GARDENER'S REPORT

Although I have been aware of the organic method for some time, I have not had time to practice it correctly. I have accomplished quite a little just the same as is illustrated by the following.

Year before last we planted our garden on soil that had been in small grain for years on end. It had been Fall plowed and then disced once that Spring with a large farm harrow. It received no further preparation for planting other than a half-hearted attempt to level it with a garden rake. This garden was not a total failure. But it was poor enough, especially in

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For your convenience, the West Coast advertisers have been included on pages 51 to 53....

quality. And it was completely bug-ridden. There were no squash after the striped beetles finished, and no cabbage when the worms stopped eating. Melons simply would not grow. The muskmelons even failed to sprout. Wax beans came up four inches and stopped producing some edible beans. Surprisingly, the tomatoes did well but they were susceptible to blossom end rot and were slow at ripening. Sweet corn ears would not fill out. Popcorn, though, produced two good ears per stalk. The potatoes came through with a yield of only about 25 bushels per acre. The soil, with the exception of a few small areas, became very dry and hard at mid-summer. When we hoed, we could only scrape the weeds off at the surface.

Small grain had always produced well on the soil. It surely must have been of poor nutritional quality.

This Spring I selected a half acre, adjacent to the last year's patch, which had been in barley. I double disced the stubble and the natural cover crop of pigeon grass into the soil as soon as I could work it. Twice more I disced under the fast sprouting witch grass. By this time the ground was very dry at the surface but an inch below there was moisture enough for germination. This could not be said for neighboring fields which had been Spring plowed. I then planted the early vegetables. The parts reserved for later plantings received an additional discing.

This garden did much better than I hoped it would. From 13 tomato plants we could have harvested four bushels. A 20-foot row of unthinned preserving tomatoes yielded three times our needs. I sold seven dollars' worth of cucumbers, besides all we ate and canned, from twenty plants. Sunflowers grew nine to eleven feet high with well filled heads. Sweet corn produced six times better than the year before and each stalk grew at least one large well-filled ear. I harvested 150 three- to six-pound butternut squash from 40 hills in spite of the beetle population. Forty feet of un-

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thinned carrots yielded enough large ones for two families. Our popcorn produced bushels and matured early. There were many bugs, lots of different sizes, shapes and colors, but their damage was negligible. There were cabbage worms by the hundred but they still were not numerous enough to destroy all of the large variety from the cabbage family that I had planted. Robins were busy in the potato patch from the time they sprouted until the sprouts were large enough to be safe from the cutworms.

Many families here lost half their gardens to the cutworms this year. I lost only an estimated twenty grossly unneeded bean plants. This half acre was teeming with ladybugs from late Spring until Fall. And I discovered some young earthworms under the squashes. You don't ordinarily find earthworms in the grain fields around here.

When my discing in of small quantities of green manure produced such markedly better results, what miracles I can expect from the five tons of compost I have ready for next Spring!

I constructed my heap very haphazardly using lumpy, strawy manure and extremely coarse weeds. It did not get the correct amount of water because there was none near enough to be handy. Still it heated immedi-

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ately and could have been used this Fall. I made the heap in late July.

Eldon E. Johnson,
Rte. No. 1, Henning, Minn.

—o—

NO PESTS

If you raise vegetables for your own use you may be interested in the wonderful results my compost is producing. I have just finished one lot of Early Jersey Wakefield cabbages and I have not seen a single cabbage worm. It used to be necessary to pick them off as well as to dust or spray. For the third season, now, my beans are practically free from the bean leaf rollers that used to ruin them in spite of spraying. Potatoes mulched heavily with water hyacinths and other vegetation, almost ready to dig, have not been visited by any pest—but then, I have never seen a single potato bug since coming to Florida. They seem not to have discovered us so far. We have the corn ear worm, but not a case of smut on the corn.

Edwin H. Abrams,
St. Cloud, Florida.

—o—

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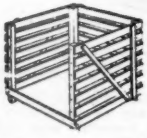

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ing seeds around poles is to start the seeds in a pile of rich compost, preferably one that is nearly ready to use. They are quite likely to sprout and appear in six days, then grow rapidly. When two true leaves have developed, transplant to the poles. At this stage they are easy to transplant and they go right on growing with no noticeable setback. Soil around the poles should be well mixed with compost sometime before the young plants are ready. If no compost heap is at hand, make a small mound of rich, light soil well filled with humus; cover with two inches of soil.

Edwin H. Abrams,
St. Cloud, Florida.

—o—

Dear Sir:

I am enclosing a snapshot of a tobacco field taken some days ago to show how much POISON is dusted on this plant which cigarette smokers consume. God only knows how much of this poison, arsenate of lead, the cigarettes contain. Talk about the flies having developed an immunity to DDT, and may some power help the unfortunates who have the cigarette habit and consume this highly poisoned weed.

From the photograph you cannot see the amount of lead arsenate that is used, but suffice it to say it looked as if there had been a snow storm and all the snow had melted except on the top of the tobacco leaves. You can see that so much was used that a lot of it fell off on the ground about the plants, thus poisoning the soil, killing the bacteria, and dousing the root area from which a percentage will be absorbed by the roots of the tobacco plants. Some job!

R. A. Caldwell,
Barwick, Georgia

—o—

BANANAS

Dear Friends:

I want to tell you what compost did for my bananas, as compared with

my neighbor's bananas. I planted 25 banana trees, but my neighbor had planted 30 banana trees several months before I planted mine. When I had 25 bunches of bananas in various stages of development, he had just 6 bunches of bananas which were much smaller and of inferior quality.

I did not have any compost, so I put chicken manure well away from the trees when I planted them and the roots would not reach this manure for several months. I also gave them some Keawe leaf mold. I finally gave them some compost, but not nearly as much as they should have had for full results. I had never grown bananas and was told by my advisers that I could not grow bananas on my place on account of the dry, whipping wind and the rocky nature of the land. I am on a high exposed place and much of the soil is eroded down to the lower areas.

My neighbor does not believe in compost or natural fertilizer and burns all his grass, weeds and other vegetable matter. He is in quite a sheltered spot in the lowland where the good soil has eroded down on his place and lodged there. He is an old timer at growing bananas.

I am going all out on compost and when I get an adequate supply, I will really have something worth showing in my bananas, papayas and other fruits and vegetables.

Charles W. Baum,
Box 324, Kihei, Maui, Hawaii

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ORGANICS IN GEORGIA

As you probably know, the soil of South Georgia is not noted for fertility. However, our little home garden, by the use of compost that has been thoroughly worked over by earthworms, their product being placed in the drills in which potatoes and beans are planted, show good results. Potatoes planted 18th Feb. 1949 were being used 60 days later, and showed this date an estimated yield at the rate of 496½ bushels per acre. 18 "bugs" have been found on the patch so far.

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poisoned food, when there is a way to avoid it?

R. A. Caldwell,
Barwick, Georgia

—o—

TOMATO JUGS

In the March issue of *Organic Gardening* I came across an article "Early Tomatoes in the Garden" by Mrs. Homer R. Sprague.

I am interested in this and decided to try it this year. She mentioned boiling the jug in hot water then setting it in a pan of cold water to crack the bottom. A simpler way of cutting out the bottom and a smoother edge of the jug, is to dip a string in kerosene, wind it around bottom of jug as close to bottom as possible, about four or five times. Turn jug upside down, put in can if necessary to hold it firm, light string in four or five places. The heat will crack the jug and the bottom can be lifted off.

Mrs. Alvina Hardy,
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CANCER—PART VI

THE GREEN THEORY OF SULPHUR—PART (B)

THE previous article described the cancer theory of C. E. Green, based on his book *The Cancer Problem* (W. Green & Son, Ltd.—1917). It indicated that the sulphur in coal smoke may be one of the causes of cancer. It proved this by drawing attention to statistics and descriptions of sections of various cities or regions where cancer mortality is high and to cancer houses where, because of the complicated construction of roofs, smoke swirls and eddies back into the rooms to the hurt of the occupants. Where people lived in hollows or in slopy regions there was always more cancer because this caused smoke to go back into the houses. In flat regions or in places where the houses had uniform, flat roof-tops, it was amazing how much less cancer there was.

In the county of Nairnshire which had the greatest rate of cancer deaths in all Scotland, Mr. Green was at first baffled by the fact that the cancer deaths for the last ten years of his study were confined to a definite area, and the rest of the county was entirely free. Green says:

"The most striking point of all, however, remains. How are we to account for the fact that in this county, which has been shown by statistics to have the highest death-rate from cancer in Scotland, there is a tract of about 100 square miles, mountainous, with houses on slopes and in hollows, inhabited by 1,000 people, eating and drinking and smoking in the same way as their immediate neighbors, engaged in much the same pursuits, and yet so free from cancer that the nearest approach to it is one case of rodent ulcer?"

Green explains this on the ground that the inhabitants here do not use coal. Because no railway traverses it, they are forced to use as their fuel peat from local peat bogs. Coal contains sulphur, while peat has very little of it. The part of the county that has the highest cancer rate in Scotland burns coal and there Green found that the statistics of cancer vary on whether the particular place is flat or on a slope, or whether the roofs are flat or cut up. In the peat-burning section, however, it made no difference what kind of roofs the houses had, or whether the houses were located on an incline or on the flat. If peat smoke came into the houses, the fact that it had practically no sulphur in it made it harmless and the people could breathe it without getting cancer.

In order to check his results, Green investigated Orkney, which is split up into many islands, on some of which nothing is burned but peat and on others nothing but coal. He got the address of every patient who had died from cancer in these islands during the last ten years. He wrote to every parish minister asking details regarding fuel used. Wherever peat was burned the cancer death-rate was below the average. He says:

"In Stenness, for example, which has a cancer death-rate of only 1 out of 42 from all causes, peat is the universal fuel. The same is the case in Hoy, Rousay, Walls, Flotta, Orphir

and Stromness. Where only coal is burned, as in Papa Westray and Sanday and Shapinshay, the proportion of cancer deaths to those from all causes is, as will be seen, 1 in every 9."

Green was confounded by three districts in which there was a very high mortality from cancer in what appeared to be purely peat-burning districts. At first he thought that there must be some mistake, but was assured by the ministers that these places burned only peat. Then it occurred to him "that there might be peats and peats." Accordingly he got samples of peats from various districts and had them tested by a chemist. The result was a great surprise. The peat from the three questionable districts had as high a content of sulphur as coal. It handled like coal and was hard and stony in appearance.

After making a detailed chemical analysis of all the peats, he found that in the sections where cancer was practically unknown, the sulphur content was only between 10 and 19 one-hundredths of one percent in the peat. Where cancer was rare, it was 24 one-hundredths of one percent, but where cancer was quite common, the sulphur content of the peat was between 75 and 89 one-hundredths of one percent.

Green went to France. He gathered data affecting every department of the country and drew a detailed map showing each tiny department. This he spread across two pages in his book. By light and shade he indicated where coal was the staple fuel and where wood was used. He also indicated the cancer mortality rates. A glance at the map shows that cancer is mostly confined to the northern half of France, the colder portion, where more fuel is burned. This agrees with the statistics of cancer in the United States which I presented in the last article. The Southern United States showed much less cancer deaths. It is absolutely amazing, in Mr. Green's map, at the way his cancer theory is proven. Wherever wood is used, there is less cancer. Where coal is the fuel cancer mortality is much higher by tremendously significant amounts.

There were three places—Cantal, Aveyron and Tarn where coal was used and the cancer rate was low. Green wrote to the préfects of those places and received specimens of the coal used in those towns.

"It is a beautiful, hard, glistening, jet-like substance," wrote Green, "apparently without any impurities such as pyrites, and totally unlike the coal to which we are accustomed. On analysis it showed the same sulphur content as the peat from Nistaben and Ardclach in Nairnshire, where cancer is very rare."

Green was looking for a cause of cancer. He had narrowed down his trail to sulphur. He had incriminated coal, which contained sulphur, but now he decided to investigate the use of sulphur in places other than that of coal. He decided to find out what industries and vocations used sulphur or came into contact with it and to see if the cancer statistics could be correlated with them. He obtained the cancer mortality rates per one hundred thousand of population, of various occupations, the last ones available to him covering the period from 1900 to 1902. Here is what they showed:

Occupation	Comparative Mortality Figure from Cancer
Chimney-Sweep	136
Inn, Hotel Servant (London)	133
Brewer	112
Furrier, Skinner	111
Seaman, etc., Merchant Service	103
Tin-Plate Goods Maker	95
Domestic Coachman, Groom	94
Innkeeper, In London	94
Inn, Hotel Servant	88
Chemical Manufacturer	85
Lead Manufacturer; Leaden Goods Maker	82
India Rubber Worker	82
Boilermaker	82
Wood Turner, Copper, etc.	80
Textile Dyer, Bleacher, Printer, Finisher, etc.	79
Tramway Service	79
Costermonger, Hawker, etc.	79
Messenger, Porter, etc.	79
Lace Manufacturer	79
General Shopkeeper	78
Cabinetmaker, etc.	75
Bargeman, Lighterman, Waterman	75

Coal Miner	51
Silk, Satin, Crepe, etc. Manufacturer	51
Saddler, Harness Maker	51
Farmer, Grazier, Farmer's Son, etc.	51
Brush, Broom Maker; Hair-Bristle Worker	51
Schoolmaster, Teacher	49
Inn, Hotel Servant (Industrial Districts)	49
Clergyman, Priest, Minister	48
Agriculturist	48
Platelayer, Railway Laborer; Navy, etc.	48
Gardener, Nurseryman, Seedsman	48
Railway Engine-Driver, Stoker	48
Farmer, Grazier, etc.	46
Coal Miner (Monmouthshire and South Wales)	46
Farm Laborer, Farm Servant	45
Coal Miner (Lancashire)	44
Agriculturist in Agricultural Districts	44
Coal, Coke Merchant, Dealer	44
Laborer, etc. in Agricultural Districts	42
Coal Merchant	42
Lock, Key, Gasfittings Maker; Gasfitter	41
Wheelwright	40
Copper Miner	39
Paper Manufacturer	39
Copper Manufacturer, Worker; Coppersmith	39
Tanner	33

Green says that it is the coal soot with which the chimney-sweep comes in contact that must cause the cancer. It is not the sulphur which it contains as such, which causes the disease but the fact that combustion has rendered it into the form of ammonium sulphate. Coal dust itself which contains sulphur does not seem to produce a high rate of cancer in the coal-miner as can be seen from his much lower cancer rate in the table. Possibly small amounts of finely ground coal might be used as a soil amendment in very limited amounts, but this should be investigated first by laboratory and field tests. However, the use of any kind of coal ashes as a fertilizer or soil conditioner, because of its content of sulphur compounds which are the products of combustion is to be strongly condemned. In a ton of coal an average yield of ammonium sulphate is 147 pounds, says Green.

In the case of inn and hotel servants Green says they live often under smoky conditions. The brewer's high cancer mortality rate is due to many contacts with sulphur compounds. He works among wort boilers where soot accumulates. The caramel used to color beers is prepared by charring the sugar with sulphuric acid. The brewer is constantly handling sulphured hops, the sulphur being used to bleach them. The sulphur then exists in the beer as sulphuric acid. Antiseptics are used in beers, says Green, such as bisulphate of lime. Other sulphates used are sulphate of sodium, sulphate of potassium, sulphate of magnesium, etc. Brewer's glucose is used, made by hydrolyzing potato starch by boiling with sulphuric acid. This was in 1917. How is beer made today?

The furrier and skinner are near the top of the list of cancer mortality, the tanner at the bottom. Furriers and skinners use alum, which is composed of sulphuric acid, alumina, and water. The mordant used with dyes is chiefly sulphuric acid. Benzene is used which is a coal tar product agitated with strong sulphuric acid. The tanner who has a low cancer mortality rate does not use sulphur products. He steeps his hides in lime which apparently is a prophylactic.

Seamen are constantly under a pall of black smoke. Tin-plate manufacturers—In order to get the tin to adhere to the iron it is necessary to roughen the iron plate by scouring it with sand and water and pickling it in sulphuric acid. Domestic coachman—His home was generally in a meuse behind higher buildings, where often the chimneys were smoky. He cleans harness in a harness-room with a smoky fire. And so it goes. The industries that have the higher cancer mortality rates seem in some way to come into contact with sulphur, but those who are in the lower brackets do not. For example, paper makers work with chlorides of lime, and tanners also with lime. Copper miners and copper manufacturers are low in cancer frequency. The salts of copper seem to be strong antiseptics.

In the next part of the book Green startles us by attacking the use of sul-

phuric acid in commercial fertilizers. Remember, this was in 1917 when no one ever heard a whisper against the dangers of using chemical fertilizers. He says:

"I venture to say that the explanation seems to be this—the turnip disease which I have illustrated and the potato disease are mainly due to artificial fertilizers which have been dissolved in sulphuric acid. This is so invariable that the Board of Agriculture has issued leaflets on the subject to farmers. And further—that the only known cure for this disease in the plant kingdom is lime." He refers to such fertilizers as superphosphate and ammonium sulphate which contain heavy amounts of sulphur compounds.

From what has appeared so far anyone must admit that an investigation of the use of sulphur compounds in industry and agriculture is called for. I have found that no statistics are kept in this country of cancer mortality by industries. The U. S. Government should make a survey of every place where sulphuric acid and other sulphur compounds are used and see if less harmful substitutes can be found. It seems to me this is an urgent field of investigation in the present day cancer emergency.

When we attacked the use of superphosphate, a popular chemical fertilizer, because of its sulphur compound content, we were criticized by professional agronomists as being crack-pots and cultists. But at the Tennessee Valley Authority (the TVA) the U. S. Government has perfected a process of producing a phosphate fertilizer without the use of sulphuric acid. It is done by melting the raw phosphate rock in a shaft furnace at a temperature of 1300° centigrade. Instead of the strong sulphuric acid working on the rock to make it soluble, so that it is immediately available to plant roots, the high temperature of the furnace breaks down the structure of the rock and accomplishes the same purpose.

For some reason the Government has decided that sulphuric acid shall not be used. It would be marvelous if this bit of change in the chemistry and technology of fertilizer manufacture now be extended further, and be applied also in other fields. It has been done in this one case. It can be done in others.

Sulphuric acid is used today in such tremendous quantities that Roger Babson has stated that financial experts follow the statistics of yearly sulphuric acid usage as a barometer of financial well-being. It goes up in prosperity and goes down in adversity. The reason it is used as a bell-weather is that industry employs it in so many places. It is so widely distributed and thus reflects a broad coverage of conditions. It is a disturbing item which must be thoroughly studied and analyzed if we want to get at the bottom of the cancer problem.

Mr. Green died many years ago. He was an unsung genius. Perhaps some day a statue to him will be erected in a prominent place.

(*To be continued*)

Miscellany . . . .

New Chemical Fertilizer Methods

The San Francisco Examiner of July 24, 1949 said:

"Future fertilization practices may be altered due to recent findings of University of California scientists that undissolved elements as well as liquids in the soil play an important part in plant growth.

"The importance of the undissolved elements was discovered during investigation into soil fertility conducted by Dr. Hans Jenny, assisted by members of the division of soils in the College of Agriculture.

"The tests are aimed at improving fertilization practices, now hampered by lack of adequate information on the reactions occurring in the soils.

"'At the present time application of fertilizer is still a hit or miss proposition, comparable to a pill given to a patient suffering from an unknown disease,' Doctor Jenny said."

Isn't this what we organiculturists have always said? What they mean by undissolved elements is the phosphorous in raw phosphate rock, for example, which according to the scientific concept is not supposed to be soluble or available to the plant, but insists on being so. We have always maintained that in the future, great use will be made of these "undissolved elements" in all kinds of rocks which are available by the billions of tons.

•

Do Dogs Know?

From a letter written by Bernice Warner, of the Ohio Earthworm Farm, Worthington, Ohio, who grows her vegetables by the organic method:

"We have a Mother Welsh Terrier and her year old son, beauties of the species, and this spring we picked our first mess of green beans. Company came, so the amount we picked was not enough. We bought some more to add to it. Do you know that not only the humans forked the others to the side, but even the dogs left the other beans on their plate? Now who knows good food?"

•

Humus Does It

Mr. MacDougall, of MacDougall Earthworms, of Penticton, British Columbia sent us the following memorandum recently:

"During the Spring months there were tests run by MacDougall Earthworms in the greenhouse of the secretary of the Vegetable Growers Association, proving that compost finely broken down by earthworms would reduce the loss of seedlings by damp-off bacteria from 20% to less than 1%. Also one patch of field tomatoes were treated with compost.

"On Wednesday, July 6th an inspection was made of these trial plots. This project was started by the Government Experimental Station at Summerland, B. C. in conjunction with the farmers of Osoyoos district.

"A few days before the inspection, the horticulturist from the Experimental Station saw the patch of tomatoes which had been treated with compost, and remarked about the lack of sunscalding and slight amount of splitting from sprinkler irrigation and the better fruit on this patch to the surrounding tomato plants.

"In the course of the inspection on the Field Day, Mr. James, the horticulturist from Kelowna, continually stressed the importance of humus for the building of the soil and on the possible importance of growing their own seed within the district.

"After looking at several fields with different varieties for earliness, we were taken to a plot which had *Verticillum Wilt*, which is a disease prevalent in the district. At this patch, a Mr. Woolliams, the plant pathologist from Summerland and bacteriologist for the Vegetable Growers of the Okanagan Valley, gave a discourse on this disease, pointing out that composts or manures plus crop rotation were the only means of combating it successfully. He enlarged on the reaction which took place in the soil life and its relation to disease bacteria."

•

Mycorrhizae

In the July 1, 1949 issue of *Science*, there is an interesting article on the subject of Mycorrhizae. This is a fungus that grows on the roots of many plants. At first it was thought to be a parasite that saps the strength from plants, but for the last fifty or sixty years has been recognized as an aid in the nutrition of the plant. It lives in a symbiotic relation with the roots, preparing food from the soil for them. In the final stages of growth the roots practically absorb all of the mycorrhizae.

Sir Albert Howard studied this interesting phenomenon, and found this fungus to exist on many food plants. He noted that where chemical ferti-

lizers were employed, the mycorrhizae were defective and were not finally consumed by the plant. The use of compost results in a heavier formation of mycorrhizae and a richer root system. The article in *Science* says that in checking pine seedlings with and without mycorrhizae on the roots by immersing roots in radioactive phosphorus, they were able to discover that:

"Mycorrhizal portions of roots of pine can accumulate much larger quantities of phosphorus than non-mycorrhizal portions. Root segments bearing short, unbranched pseudomycorrhizal lateral roots appear to accumulate more phosphorus than typical unsuberized root tips. It seems possible that mycorrhizal roots have not only a greater surface, but also a greater capacity to accumulate phosphorus per unit of surface than non-mycorrhizal roots."

•

A Typical Newspaper Item

All over the country are appearing items like the following which was in the June 25 issue of the *Newburyport Daily News* (Mass.):

"Even the backyard gardener is talking about organic gardening and mulching this year. Mulching with straw or salt hay is a labor saving method of avoiding the results of drought and the backbreak of weeding. The organic method of gardening means that with composting, and its utilization of lawn clippings, natural fertilizers such as manures, and the addition of these composted materials to the soil, the resulting benefit provides a soil alive in organic materials. Soil such as this is rich in minerals and in the unknown life-giving forces necessary for plant growth and human health. Plants grown in it are particularly resistant to disease and to bug invasion. One of the sad truths of our growing use of chemicals has been the quick production of foods but the depletion of the soil with an onrush of disease and bug foes. Gardeners interested in the health of their families are working on their compost piles."

Against Indiscriminate Use of Sprays

Tom Linder, the Farm Commissioner of the Georgia Department of Agriculture, seems to be on the warpath against the indiscriminate use of poison sprays. This attitude is being adopted by more and more scientists. In the July 13 issue of the State publication called *Georgia Farmers* he says that "Thirty years ago very little insecticides were needed on the farm." The boll weevil made his appearance for the first time in south Georgia about 1917. He talks of new fungi that gradually made their appearance. "Because of extensive use of poisons, it naturally followed that in the effort to exterminate some insect pests that other insects beneficial to plant life were also destroyed. In some ways, it begins to appear that the use of insecticides after a while creates a vicious circle which, as the years go by, tends to defeat the very purpose for which they are used. Any germicide or insecticide, when "constantly used in the treatment of either animal or plant life, tends to produce a race of germs and insects which are immune to that particular germicide or insecticide. In other words, as time goes by, it is necessary to find new remedies for the same old disease or pest. It begins to look as though somewhere down the road we will have to find the PEST CONTROL TO END ALL PEST CONTROLS or else we may find that we have exhausted all the remedies and have produced bugs and germs that are immune to any and all remedies.

"Should that time come, then we would be forced to do what we probably should be doing today and that is we must breed natural insect enemies to control insects and natural germ enemies to control germs.

"Because of the ever increasing losses in agriculture from insecticides and fungicides, the Legislature has enacted laws to control the sale of these products so as to protect the farmer as far as practicable. Because of the tremendous increase in volume and money value of insecticides and fungicides, and because of the large number

of manufacturers, mixers and blenders in the business, and also because of the practically unlimited number of formulae possible, the number of registrations with the Commissioner of Agriculture has grown enormously.

"Because of the fact that the experience of many farmers indicates the sale of some insecticides and fungicides which do not do the job for which they are sold, it has become necessary to be very strict with the manufacturers and mixers and blenders as to the quality and effectiveness of the products which they offer for sale.

"Because of all these reasons, I have issued a new regulation requiring all manufacturers, mixers and blenders, before offering for sale in Georgia any insecticide or fungicide, to furnish a sample of each product which they propose to sell along with their application for registration. They are also required to furnish copy of all labels and all literature to be used in connection with the sale of such insecticide or fungicide. They are further required to give in full detail the name and the amount of each and every component going into the mixture, including all active ingredients and also all inert ingredients. I have instructed the Long-term Fertilizer Inspectors to secure samples of each and every brand of insecticide and fungicide sold in the State out in the field so that we can check the product actually delivered to the farmers against the sample furnished to this Department by the manufacturer, mixer or blender.

"I have asked the State Chemist to analyze all of these samples as rapidly as possible and any product found which does not comply with the registration and the original sample will be withheld from sale.

"It is a direct violation of the State Law for any manufacturer, mixer or blender to sell or offer for sale in this State any insecticide or fungicide which has not been registered by the Commissioner of Agriculture and approved for the use for which it is sold by the State Entomologist.

"All dealers, salesmen and others selling any insecticides or fungicides to farmers should be very careful to ascertain that such insecticide or fungicide is properly registered before buying it and especially before re-selling it to farmers." J. I. RODALE.

The Soil and Health Foundation

THE Soil and Health Foundation is making every effort to establish the relationships between the soil, foods, and health. In this connection, the following news item taken from the Journal of Medico-Physical Research, Oxford, Indiana is of particular interest:

Dr. Benjamin P. Sandler of Asheville, North Carolina, claims 'without reserve' the discovery that a controlled diet will immunize a person within 24 hours from infection by the dread infantile virus.

The doctor said that he and other doctors had learned through experiments started ten years ago that elimination of sugars and starches from the diet will ward off polio.

Sandler, now a physician at the Oteen Veterans Hospital here, released the information about his reported discovery during the height of a record-breaking polio epidemic that to date has struck 1,172 persons in North Carolina.

Sandler said: "I am talking about this discovery now because I think the polio crisis requires immediate release of all our research findings."

At present laboratory activities are concerned with pH studies of soils and various other materials, and the microflora of composting materials.

Contributions should be sent to the Secretary, 46 South West Street, Allentown, Pa.

Dr. William H. Eyster.

HOW TO PLANT BULBS

By
Dr. William H. Eyster

Scaly bulbs of the Regal Lily

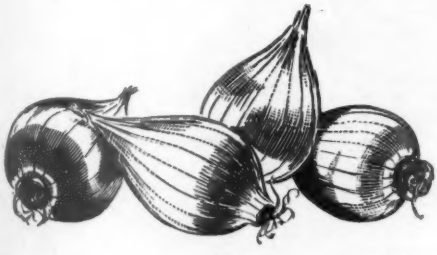
EVEN though the majority of bulbs will grow in almost any kind of soil, practically all bulbous plants thrive best in a well-drained soil. In poorly drained soils bulbs deteriorate and finally disappear. While most bulbs will produce blooming plants in poor soil, many of them will give better results in good soil.

There are two general methods of planting bulbs. According to the first method, the bulbs are placed on the surface of the bed where they are to be planted, and then planted in an individual hole dug with a trowel. In placing the bulb in a hole made in this way, it is important that the base of the bulb be in full contact with the soil and not have an air pocket at the bottom. It is to avoid an air pocket that a trowel rather than the old method of using a pick or crowbar be used.

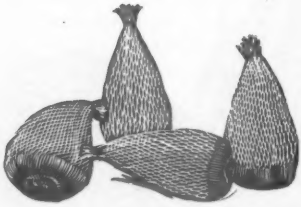
The second method, commonly used in formal gardens or large beds, consists in removing the top soil from the entire bed to a depth to which the bulbs are to be planted. Set the bulbs in place and shovel back the soil, being careful not to move any of the bulbs. This method can be used only where there are no perennials and involves a lot more work than necessary for home planting.

Depth of Planting

Each kind of bulb, and in lilies each variety, has an optimum depth at which it should be planted. In general, bulbs should be planted from two to three times their own depth beneath the surface. In extremely light soils, bulbs may be planted somewhat deeper than in heavy clay soils. The depth of planting of each kind of bulb is shown in the accompanying illustration. (See page 22.) The closer you follow this chart in planting, the better you will be pleased with the final results. Some bulbs are able to assume the right depth in the soil by means of "contractile" roots which, by be-



Cone-shaped bulbs of
Iris Wedgewood



Bulbs of Freezias have netted husks

Spanish Iris

coming shorter and thicker, are able to pull the bulb or corm down to the correct level. It is in this way that seedling bulbs of some plants, as scilla, are able to travel from near the surface to several inches underground. In crocus the new corm is developed on top of the old each year, but the new corm is pulled down to the proper depth by the contractile roots.

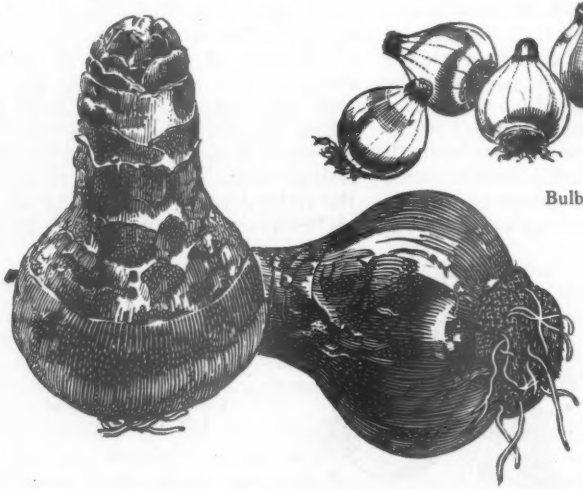
Selecting Bulbs for Planting

Bulbs, as a rule, are graded according to size expressed in inches or centimeters (a centimeter is equal to about 2½ inches). In some lists the bulbs may be listed according to circumference, which is about three times the diameter. A bulb or corm having a circumference of 2¼ or 3 inches has a diameter less than an inch. For exhibition blooms, select the top or exhibition size. For garden beds, first or second size bulbs will be adequate and sometimes preferable. In tulips, select the second size for outdoor planting. The daffodil bulb is perennial so that the largest bulbs are the best. Bedding-size hyacinth are preferred for outdoor planting because their spikes are not so heavy and therefore are less likely to be marred by the battering winds of early spring. Do not buy cheap bulbs because they are either diseased or small or otherwise undesirable. Recommended sizes of bulbs are shown in the illustration, all drawn to the same scale.

Bulbs in the Flower Border

Bulbs are very effective in the flower borders and flower beds, where they may take their place among the other

Bulbs of Snowdrop



Amaryllis, largest of the common bulbs

Tulips

flowers as a unit in the succession of bloom from spring to fall. They make the border colorful in early spring while other plants are making their plant growth, and die down and disappear as they are displaced by the other plants of the border. In the border, the bulbs should be massed irregularly in groups of six to twenty-five.

Bulbs Among the Shrubs

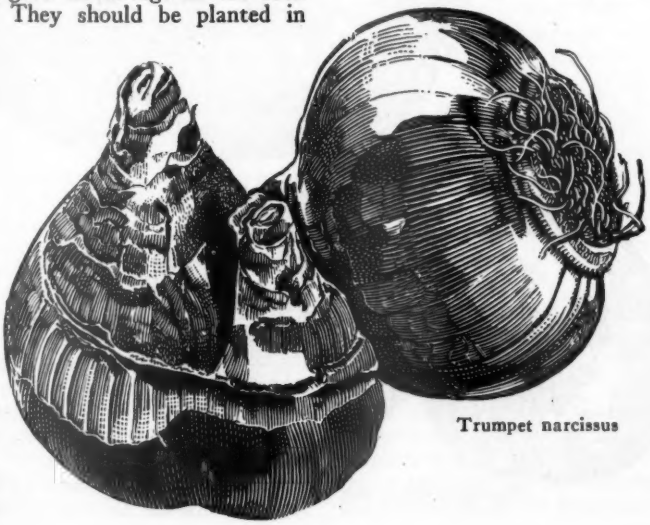
Groups of bulbs may also be spotted in the shrub border. Clumps of the low-growing crocus and grape hyacinth, and the larger and more brilliant tulips and narcissus will be found very effective.

Bulbs in the Rock Garden

The smallest types of bulbs may be used to good advantage in the rock garden. They should be planted in clumps beneath such rock plants as will not form a solid mat over the surface of the soil. They will make their contribution in color and fragrance in their season and then they will withdraw and be hidden by the later-blooming rock plants above them. Especially adapted for the rock garden are crocus, snowflake, snowdrop, glory of the snow, squill, winter aconite, dogtooth violet, grape hyacinth, coral lily, and *Tulipa kaufmanniana.*

Bulbs for Shady Spots

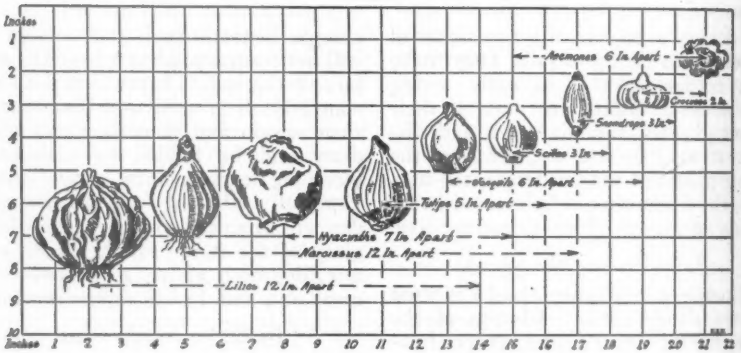
Shady spots in the yard may easily be beautified by the use of narcissus, camassia, crocus, dogtooth violet, and many of the lilies. Of course, the soil in such places must be well enriched with plenty of good compost.



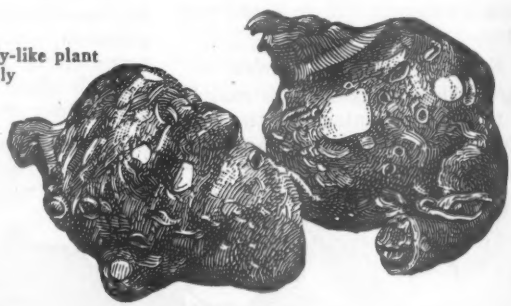
Trumpet narcissus

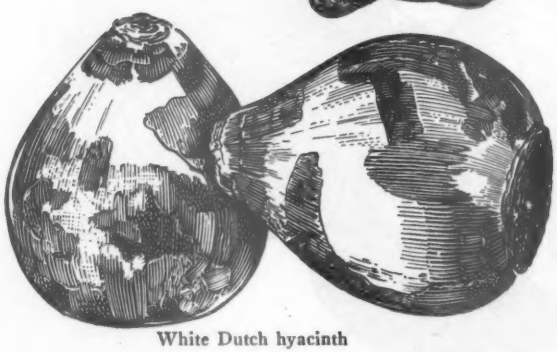
Paper-white narcissus

Corms of crocus



Rhizome of calla, a lily-like plant that is not a lily





White Dutch hyacinth

Lore of our Native Witch-Hazel

By G. L. WITTROCK

Assistant curator of Education, New York Botanical Garden

WE associate our late fall season in New York with autumn colors, the falling of leaves, the possible remnants of native fruit still present and giving color, or the general naked character of the shrubs and trees that make up our native floral landscape. Plant life, in general, we know has gone to rest for the winter. During this late season as one hikes through the woods, or drives along highways that pass through woodlands, a shrub or small tree may be observed with light yellow structures that suggest a series of crawling yellow spiders. Stopping to observe closer, these ornate objects are not spiders but prove to be flowers, and more surprising, small, hard, beaked fruit capsules are also present, possibly mature with black stony seeds. Naturally, you will conclude that this must be a freak caused by weather conditions, an abnormal state, since fruit and flowers in the late fall to early winter or the Christmas season are not the rule. You are observing an exception in the plant world for the blooming and fruiting shrub is behaving normally; it is our common "Witch-Hazel, *Hamamelis virginiana.*"

You are not the only one to have been impressed by the flowering habit of this plant. In the olden days the shrub was shrouded with a great deal of superstition as indicated by its most common name, "Witch-Hazel". The forked branches served in colonial times as divining rods faithfully used in search for water and even valuable ores. This superstition was based primarily on the belief that its mysterious powers must exist to account for the common name. It was originally spelled "Wych-hazel" so named after the "Wych-elm" because its leaves were similar and for no other reason. The wood of the elm, however, was made into chests originally called "Wyches", an old Saxon word which is pronounced as "Witches". Thus "Wych-hazel" evolved to "Witch-Hazel" by not only changing the spelling of "Wych" to "Witch", but giving an entirely new meaning to the word and adding a superstition that was easily acceptable in the olden days and possibly associated with the abnormal conduct of the blooming period; people of those days were always interpreting adverse conduct of nature in terms of witchcraft.

The name "Hazel" in the common name "Witch-Hazel" is merely a comparative term since the leaves of the shrub do suggest those of our common Hazelnut, though these species are in different families.

The species name *"virginiana"* is easily understood; it indicates that the original material received by Linnaeus may have come from Virginia, though our species is found from Nova Scotia to Ontario, Minnesota, Florida, and Texas. The generic name, *Hamamelis,* is another story. It seems to be a compound Greek word: *Hama*: meaning, together; and *melon*: an apple or fruit; thus describing in one word: fruits and flowers at the same time.

Other common names of the shrub are: "Spotted-alder", "Tobacco wood", "Snapping Hazel", "Pistachio", "Winter bloom", "Noisetier de Sorciere" (Fr.), "Virginische Zaubernuss", "Zauberhazel" (Ger.); and "Toverhazelaar" (Dutch).

We like to believe that all plants are or have been at one time of economic value to man. Let us consider the possibilities of this species. Who has not heard of the medicinal lotion,

Witch-hazel in full autumnal bloom

Witch Hazel, the soothing, colorless, liquid so often used and listed as one of the important home remedies for many aches and pains. Is it really the panacea as proclaimed? First note what our American Indians did with the plant; they must have made some use of the shrub and if they did, we naturally would have learned it from them.

The Menomini tribe of the Wisconsin area brewed a decoction of the Witch-Hazel which athletes used to rub on their legs before participating in their strenuous games such as Lacrosse; a remedy still popular today. The medicine man prescribed it as a rubbing liniment to cure a lame back; another remedy we still use. This tribe also used the black, stony seeds

as sacred beads for various medicinal ceremonies. The Forest Potawatomi placed the twigs in a vessel of water and with heated stones formed a steam; this was a primitive, medicinal form of steam bath for sore muscles. The Chippewas of Michigan used the inner bark as an emetic, especially in cases of poisoning. They also prepared a lotion from the bark which they used for any skin trouble and it was highly valued as wash for sore, tired eyes; an eye-wash that most of us still use; it does give relief.

In herbals it has been prescribed as excellent for dimming eyes, probably having its original through the report made by the famous Swedish botanist, Peter Kalm. He reported that the fumes from a decoction of the bark were incomparable in treating eye diseases and that he observed an Indian cure a boy who had been almost stone blind for half a year. Another convincing testimonial was reported to one of our famous botanists of the past by a minister of the Church of England officiating among the Mohawk Indians; he observed a case of almost total blindness, caused by a severe head blow. It was actually cured by receiving a steam application of a decoction from the bark through a funnel held upon the injured part; this was done by the medicine man of the Mohawks after all other known methods and remedies of the time were tried and had failed. Such reports in the early 18th century would result in many remedies; hence the plant was introduced for cultivation in Europe in 1736 by Peter Collinson, Esq. for the medicinal bark. With this evidence expounding the curative qualities of Witch hazel, what did herbalists of the past and present claim for the medicinal properties of the plant?

Herbalists of the past recorded that the bark and leaves had tonic, astringent and sedative properties. Decoctions of the bark were suggested in the treatment of hemorrhages, as a diaphoretic, for dysentery and excessive mucous discharges. It was even prescribed for first stages of tuberculosis. The crushed bark was recommended as an external poultice for many ailments, while a bark tea was given for a sore mouth and for treatment of hemorrhoids. Rafinesque, an early American 18th century botanist, described the properties of the plant as sedative, astringent, tonic, and discuient. He added that its medicine was excellent for painful tumors, external inflammations and sore and inflamed eyes, while a tea from the leaves could be employed for many purposes such as bowel complaints, pains in the side, and bleeding stomach.

Modern herbalists still prescribe and consider Witch-Hazel efficacious for many ailments adding even more properties and curative qualities. They state that it is valuable in checking internal and external hemorrhages, in treatment of hemorrhoids, as a painkiller for general and inflammatory bruises, and excellent to check diarrhoea, dysentery, and mucous discharges. Even cases of insect bites, such as mosquito, stings are relieved by using a pad of cotton wool moistened with the extract, when applied to the bite it will soon cause the sting and swelling to subside. The distillate of soaked leaves or bark, or both, is still a modern household remedy of the medicine chest. Our modern Witch hazel lotion is distilled commercially from the dried leaves gathered from the southern Appalachian region; while in the New England States, the bark and sometimes the entire plant is utilized. The active principle is extracted with water and steam and distilled. Our commercial Witch hazel contains a ratio of 150cc of alcohol to 850cc of the Witch hazel distillate.

With all of the listed properties and medicinal qualities attributed to Witch hazel, is it really a good medicine or merely a remedy handed down to us from the past?

The latest reported analysis reveals that the leaves contain a considerable amount of tannin ranging from 2.24 to 9.47%; 0.2% choline, a saponin, and a glycoside; the tannin at least has astringent property. An extract from

the leaves is poisonous when injected intravenously. The lotion we speak of as Witch hazel has very little medicinal virtue and as one recent report states, the lotion scarcely deserves official recognition. The analysis definitely relegates Witch hazel lotion to merely remedy with no other value than its possible alcohol content and the massage resorted to in applying it externally. However, why not take a pragmatic attitude toward the lotion, since we do feel relief when using it; if it soothes and allays the aches and pains of tired, over-worked muscles, why not use it.

Other uses of the plant are equally of interest. The Iroquois Indians brewed a tea of the leaves to which they added maple sugar and served it with their meals. The nuts, which are true seeds, are said to be edible. There is much doubt about this and Asa Gray stated in 1857 that this observation of the edible nature of the seeds was made by Rafinesque who wrote in his Medical Flora that the nuts are called Pistachio Nuts in the southern States. Gray commented that he never heard of the seeds being eaten, and if they were their small size, which is no larger than a grain of barley, and the thick bony coat, would make of the nut a most tantalizing tiny nibble. Analyses, however, show that these black, shiny seeds contain a white, oily and farinaceous substance that is edible, suggesting the flavor of a hazelnut. Thus if you meet this shrub or tree in the wood in the fall why not taste the little seed and you become its judge as to its edible possibilities.

Perhaps the most valuable character of the plant is its ornamental possibility in a landscape planting. Though our two American species are not as attractive as those native to eastern Asia, they do have merit, primarily because of their habit of late blooming. The most attractive species is *Hamamelis japonica* of which there are a number of varieties. Its flowers are larger and more attractive and bloom later than our American species. I have observed shrubs of this species blooming in late January to mid February, the ground still covered heavy with snow, and the air chilled to near zero; yet the leafless branches were covered with flowers. Those of us weary of winter will appreciate this oriental phenomenon with the bright yellow colors in contrast to the drab winter cloak, and feel a bit of early spring is with us.

THE SMALL FRUITED TOMATO

By ARCHER D. WHALLON

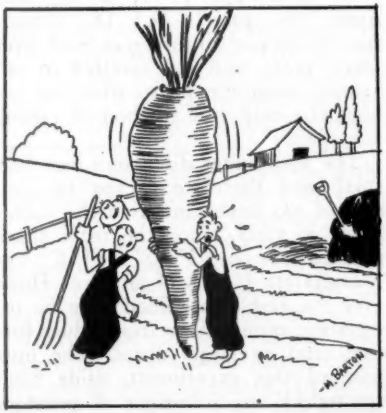
THE small fruited tomatoes, a very much neglected garden crop in this country, are really deserving of more extensive cultivation, as it has been shown that their vitamin content is superior to that of the better known large-fruited varieties. Also, they are so easily grown, so prolific, so well adapted to a multitude of uses, cooking and preservation, that they should find a place in every garden and on every table. Their advantage for canning whole is, of course, obvious, but that of ease of preparation should be stressed, for that is just opposite to the prevailing error that these fruits are difficult of preparation. The fact is, that as the skin of all the small tomatoes is very thin, peeling is never required, and it is really easier to prepare them for the table than it is to handle the large ones. All that is necessary is to break the small tomatoes from the stems. The currant or grape tomatoes are, it is true, somewhat too small for much

practical use, but this is not the case with the cherry, plum, pear, and peach varieties. The large red cherry tomato in particular, is an ideal table fruit, excellent served raw with sugar and cream, as are berries, bananas, or peaches.

All the small tomatoes are of mild flavor, with a low acid content, particularly the yellow varieties, and they are therefore easy on the sugar bowl. In the past year or two a little more attention has been given to these neglected fruits by the seed trade and some improved types are cataloged by a few seedsmen. Another commendable feature is the increased attention given the somewhat large-fruited Italian varieties of the same general fruit type, the "Pomodoro" or large red plum tomato, and the Italian Pear and San Marzano varieties. These while not strictly large tomatoes, are usually more than double the size of the familiar American varieties of similar shape. They are extensively grown in Italy for commercial canning, the canned product being sometimes offered by Italian grocers in this country. Often they are not canned whole, but in the form of a thick paste or soup stock, sometimes flavored with sweet basil, a culinary herb well known to southern European peoples. Italian type tomatoes are also now an important market crop in California. The Californian type of red pear tomato or San Marzano variety, however, differs from the eastern type of Italian Pear tomato, the shape being more flattened or cylindrical and less distinctly pear-shaped . All these thick fleshed Italian type tomatoes will keep as fresh ripe fruits over twice as long as our common ripe tomatoes.

The two peach tomatoes, both red and yellow, are also very good looking and useful fruits, ideal for canning whole. Here too, should be included the English Sugar tomato offered by a few seedsmen. This is a red fruit, an inch to an inch and a half in diameter, borne in grape-like clusters or bunches, and of exceptionally sweet flavor. Also in the same general class, as a fruit for canning whole, mention must be given the Livingston's Gold Ball variety, a yellow tomato. These fruits, of a bright golden yellow, run from one to two inches in diameter, and it would be difficult to imagine a more beautiful canning crop.

There is really but very little waste to these small tomatoes—much less than with the large fruited varieties. So many recipes for their preparation are given in works on canning and in farm papers that this, together with the fact that they can be handled the same as many other berry and fruit crops, makes unnecessary any further directions here. It may only be added that the objection of blandness or lack of pronounced flavor may easily be overcome by the addition of some more flavorful fruit, such as pineapple, and that these tomatoes, particularly the yellow varieties, are great "stretchers" for these more expensive fruits. There is also the possibility that the main valid objection to the more extended use of the small tomatoes, that of excessive seediness, can be overcome by spraying the flowering plants with a seed preventive chemical, but more experiments should be carried out in this respect. But all things considered, the small fruited tomatoes should become market fruits of a value rival to that of the strawberry.



Next time spread the compost out more!

Small Experiment with Potatoes

By S. W. EDWARDS

ON April 19, 1948 we planted 5 rows of potatoes in our garden using certain methods suggested in this magazine (see *Organic Gardening*, June 1948, pp. 11-18, 28-29; also April 1948, pp. 38-39.) Our experience in organic culture goes back over seven years, and has resulted in our definite commitment to what we believe the only true method of raising a garden.

The area under discussion here was small and therefore cannot be considered too important from the standpoint of yield, since the total space allotted was only 5' 10" x 81' 6", approximately 1/90th of an acre. However the results obtained may be interesting enough to warrant their further trial on larger areas. The purpose of this experiment, aside from raising 4½ to 5 bushels of potatoes for winter supply, was to test the branch cut method as against the local method; and, to determine if potatoes of last year from certified seed would produce as well as new seed in composted soil or "not do well" as is commonly believed locally. The custom here is to plant only "certified seed" each year.

Seed

The seed used was as follows: 10 lbs. of certified seed, Katahdins, which cost 53c; 15 lbs. of same from a neighbor, 42c; and remainder of seed was our own organically raised, small, whole potatoes. The tubers were cut up by the local method into pieces with one or two eyes to each piece, as well as by what may be called the "branch cut" method, as explained in the reference above.

The seed was planted as follows: Rows 1 and 2, seed of 1946 certified

Katahdins, raised in a neighbor's heavily manured and carefully tended garden (he wouldn't plant them); Row 3, our own small, whole potatoes; Row 4, mixture of all above, plus 1947 certified Katahdins; Row 5, 1947 certified seed, Katahdins.

The Garden

The garden area on our mountain farm, an addition to the old garden, may best be described as sod land "on the make" organically. It has been plowed twice; heavily treated with 15 year old dried chicken manure the first season; and over-and-under-laid with about 25 tons of compost the second year.

The rows were laid off with a shovel plow, filled with compost, the seed pushed down through the compost, and the row covered with soil. About 3 barrowloads of compost were required per row.

The Table Tells The Story

From these rows we raised 4½ heaped bushel baskets of tubers with the following weights, determined 3 days after digging:

Table I

Row	Cut	Yield in lbs.	Calculated yield per acre
1	Branch	51	377.5 bu.
2	Local	41	308 bu.
3	Whole	48.75	365.62 bu.
4	Mixture of above plus some as below	47.62	357.15 bu.
5	Branch	36.75	275.62 bu.

Observations

Some observations made during the growing and harvesting period may be interesting. A ground mole accounted for a considerable part of the seed in Row 5, and to some extent in other rows, until trapped. The mole likewise worked under adjacent onion rows, destroying between 1/4 and 1/3 of that crop.

When digging the mature crop, we found many portions of the branch cut potatoes, supposedly with an eye, but quite evidently without, very solid and of firm flesh in the compost. We also found it extremely easy to lift these potatoes, as all the tubers were found directly under the plant. Whether for better or worse, there were no long underground stems with potatoes on the ends pushing out between the rows, as is usually the case in ordinary soils. We did not find any evidence of disease or of the local rot. However a few tubers had been gnawed, probably by the mole, or his relatives. The potatoes were of medium to small size with an occasional giant, this giant being the only potato in the hill. We look forward to twice the yield from the same area.

Some Use Fertilizer

Taken as a whole our crop would not compare very favorably for size or appearance (two factors the public has been taught to believe in) with the huge potatoes raised by one of our neighbors, a market gardener, the major portion of whose large crop was so harvested, but also many bushels were left on the ground, filthy with rot. He quite frankly confessed that his crop suffered from an over-abundance of raw manure and a superabundance of potato fertilizer (comes in a bag). Another neighbor was forced to destroy, after storing, basket upon basket of his crop. He, too, cast fertilizer heavily into his trenches before planting and side-dressed heavily with same. Whether the effects suffered were the result of the artificials used we could not say. All of our 1947 crop, same area as above, with somewhat lower yield, passed the winter storage in good condition until used. Potatoes are said to do best in our section when planted in newly plowed land, i.e., land which has an abundance of turned-under trash.

We thought our vines looked best when a few weeds were permitted to grow along with the plants. In areas kept free of weeds we felt the plants suffered more from flea beetle. We

used lime for this bug and rotenone several times for Colorado beetle and only a half dozen plants got stripped of foliage, due to an oversight, before we eliminated the beetles. In another 3 years, with additional compost, we know from past experience, that the garden will be just about free of pests.

The County Agent informs us that the local yield is about 150 bushels per acre and that if one has "a suitable type soil" and follows "an adequate fertilizing and spraying program" one should produce above 200 bushels per acre. It is our humble opinion that compost will make "a suitable type soil"; that its use will likewise prove "an adequate fertilizing" program; and that "spraying" is definitely undesirable and unnecessary.

Organic enthusiasts with considerable acreage available for potatoes would render valuable service by broadening the scope of this experiment and repeating it for, say, 5 years.

Indications

Compost *will provide* a suitable growing medium for potatoes and a good yield will result. Inner quality should be considered of greater importance than size or appearance. Highest yield was from branch cut seed, one year removed from the northern fertilizing program. The second highest yield was from our own whole potatoes, unsuitably small for cooking. We shall continue with such as future seed.

Can Synthetic Food Substitutes Solve our Food Problem?

By Eric Eweson, Biochemist, Frazer Products, Inc.

PROPHESIES in food chemistry and visions of future "synthetic food factories" have become a more and more common subject of articles in our newspapers and magazines. It seems important to me that this kind of unrealistic and confused thinking is challenged for its careless disregard of proven biological facts.

Another article on prophesies in food chemistry, this one entitled "Chemistry Offers a Way Out for a 'Plundered Planet' in the World of Tomorrow", which appeared in the Scientific Section of the New York Times on May 15th, leads me again to wonder how many times this kind of unrealistic thinking is to appear in print without challenge.

That our growing population and declining soil fertility entail prospects of future food shortages and impaired national health is now generally recognized. But opinions on the means of prevention, which include synthetic food, intensified agriculture, and even population growth control are so conflicting that the public, on which progress towards a solution of this vital problem ultimately rests, is bound to loose interest from utter confusion. My present intent is, of course, not to review this entire problem but merely to deal with one important aspect thereof: Can synthetically-grown food solve our food problem?

Many chemists are hopefully visualizing future generations fed and thriving on "synthetic food". Their ideas focus on production of yeast protein from wood, ocean-grown plants, algae grown in shallow ponds, vegetables grown in chemical solutions, and fats produced from coal or oil. Aside from the fact, as these chemists properly point out, that eggs and meat may have to disappear from our tables because animals are much too inefficient converters of plants into protein, will these fabulous theories hold water?

Yeast as Food

The emphasis on yeast as a source of food is logical and based on its very high protein content, over 50 percent. The technique of large scale yeast manufacture is also mastered, utilizing low grade molasses, certain sugar con-

taining paper mill waste effluents, and wood converted into sugar. The other requirements for the growth of yeast; mainly nitrogen, phosphorus, and potassium are supplied in form of synthetic chemicals. Displacement of the grains used in the old-time processes, the object of the modern yeast industry for reasons of their higher cost, is largely achieved in respect to bakers' yeast and almost complete for certain types of feed yeast.

So far so good. But what happens to the yeast under these artificial conditions of growth? Significant deficiencies are indicated by its reduced vitamin content, compared for instance with brewers' yeast which is still grown mainly on grains. Synthetically-nourished yeast also loses its powers of reproduction after comparatively few generations, which requires restarting with new seed yeast every few weeks. Furthermore, such yeast lacks resistance to disease so that infections from other microorganisms especially during the growth process may become fatal and spoil entire fermentations. The yeast is also rather fragile in respect to keeping-quality and fermenting-power, requiring constant refrigeration and special wrapping.

The observant reader may discover in the above examples of deficiency symptoms in yeast fungi, which represent our lowest form of life, interesting parallels with respect to synthetically-fertilized plants representing the next higher form of life: Vitamin deficiencies in vegetables and grains, their running out of the species and the need for specially-grown seeds and hybrid varieties, their lack of resistance to disease and parasites, and reduced keeping-quality of fruits and vegetables.

Protein, the Nucleus of Life

For some light on the deficiencies in yeast we must obviously look to the protein, its main component. Protein, of which there are a great number of varieties, is the key building block of all living substance. Its detailed composition is still a deep chemical secret. A recently expressed view, and in my opinion rather optimistic, is that with our progress in analytical methods the protein mystery "is likely to be solved within the next decade or two" (Prof. Linus Pauling, Pres. of the Am. Chem. Soc.). Nevertheless, the deplorable habit prevails among many chemists and nutritional experts to regard protein as a simple compound, as if it could be properly produced for use as food from half a dozen elements, when we already know that its proper growth in nature entails at least ten times as many elements, adherents, and trace minerals and factors—the latter including vitamins and hormones.

Exactly how protein deficiencies affect the health or growth of carriers, be they microorganisms, plants, animals or humans is as yet far from clear. But we do know of many very serious effects on human health from deficiencies in various minerals and vitamins as well as from excesses of elements like potassium and sodium, all of which are so closely tied in with the proteins that it is very erroneous to consider them as separate entities. Protein complexes is a more suitable term for these combinations and their proper growth is itself the only means yet known whereby we are able to balance the extremely complicated and infinitely varying nutrient requirements for healthy life.

Recent Discoveries

Many medical authorities have expressed the opinion that malnutrition, with stress on quality rather than on quantity, is our major cause of disease. Beyond doubt it can be much more specifically stated that it is the protein complexes which hold the key to health and resistance to disease in all forms of life, from the lowly microbe to plants and human beings.

Significant support for this opinion is to be found in the discovery that protein is a necessary food constituent not only for humans and animals, as taught by our textbooks in organic chemistry, but that also plants crave protein for healthy growth. As to plants the protein usually enters the

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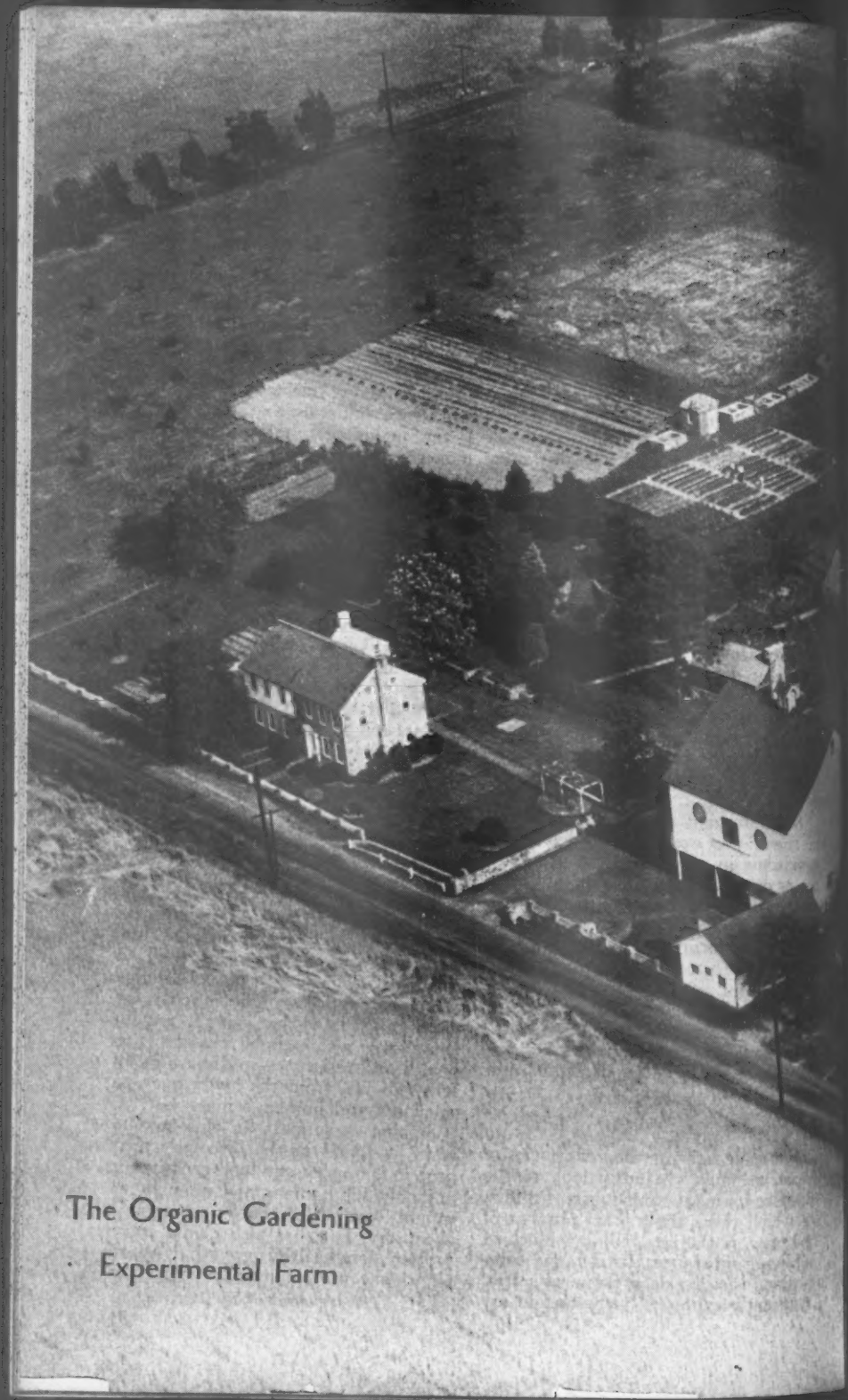

The Organic Gardening
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root system in form of microbic mycelium tissue, which is largely composed of protein. This so-called mycorrhizal association between microorganisms and plants has already been conclusively established with respect to the great majority of our cultivated plants. This revolutionary discovery explodes the old theory that plants cannot utilize complex organic nutrients like protein until they have been broken down into simple mineralized and water-soluble compounds, which theory still lends false scientific authority to our modern agricultural fertilizing methods.

Thanks to a supplementary discovery by the late Sir Albert Howard, that mycorrhizal association ceases when plants are fertilized with chemicals, which plants as we know are deficient and lacking in resistance to disease, we must conclude, and its significance cannot be too strongly emphasized, that a certain intake of properly composed protein is a fundamental prerequisite for healthy growth of all living tissue. This carry-over or circulation of protein, from microorganisms to plants and from plants to animals and humans which links all forms of life like a live wire, is obviously relatively small in quantity and may best be regarded as a seed or directing force for subsequent and more substantial growth of protein complexes in the new host. A deficiency in quantity or quality of this all-important protein carry-over is the fundamental cause of a chain reaction which is becoming more inescapable of notice every year: Declining soil fertility, crops succumbing to diseases and pests, and requiring more and more poison sprays, and the impaired state of health in animals and humans in spite of our great medical progress.

Conclusions

Synthetically-grown yeast is lacking both in carry-over of protein and in variety of nutrient requirements for additional growth of properly composed protein. These basic deficiencies in the yeast cannot fail to carry-over when the yeast is used as food. With the knowledge we now possess it is very erroneous to expect no undesirable or merely minor effects from such deficiencies in the most important of all our nutrients. The assumption made by some chemists, that before synthetic food substitutes can be recommended all of the food factors essential to growth and general well-being must be known and available in synthetic form to supplement our diet, is too fantastically farfetched in the light of our present knowledge to merit any practical consideration. It merely adds to the confusion on this vital subject. Besides, it is very unlikely that even the few food factors, like vitamins, which we have succeeded to synthesize and which are now used extensively to enrich and supplement our admittedly deficient food, actually do replace the naturally grown factors.

A distinguished English investigator in the medical field, J.E.R. McDonagh, has advanced a theory of most profound significance in this connection. He contends that by lack of proper nourishment the protein tends to grow beyond its power to hold together, which "over-expansion" causes a portion of the protein to break off, this broken-off piece being the dreaded virus. The virus is therefore formed within, and does not come from without, but deficient or damaged protein can carry on the damage if conveyed to other living forms.

There should be no need to add many words on the proposals to solve our food problem by growing vegetables in chemical solutions or converting coal or oil into edible fats. Both proposals are, of course, technically feasible but for their intended purpose they are, in my opinion, examples of "science" gone berserk. We can no more grow healthy, nourishing vegetables from chemical solutions than we can raise healthy humans and animals in that manner.

To be critical in respect to some proposals for new sources of food should definitely not be construed as gloominess, but as an attempt to clarify the issue and prepare the ground for a realistic solution to a problem on which ultimately depends the welfare and the future of our civilization.

GRINDING LEAVES

By

ROBERT M. WASON

I READ your article on grinding leaves in the December issue of *Organic Gardening*, with much interest.

I have been using the sieve method of preparing leaves for the last two years because my small garden did not warrant the expense of a suitable machine. However, I have solved my problem and would like to share the results with the readers of your valuable magazine.

I have taken a discarded lawn mower and constructed a bench to fit it and I find that it will grind leaves, including the stems and the leaves, including the stems. The leaves can be ground either wet or dry. This is a very fast operation. It will turn out around ten bushels of finely ground product in less than an hour.

There was absolutely no expense involved in the construction of my machine.

I am enclosing some pictures which show very clearly how simple the apparatus really is, and I am also sending under separate cover, a sample of the product for your opinion.

Picture number one shows the bench with the mower (with shaft removed), installed.

Picture number two shows a back board with baffle attached. The speed of the mower throws the cut leaves around against another board which is put on the front (not shown), and this makes a hopper into which the leaves are fed. A large percentage of the leaves are thrown back into the cutters and are ground very fine.

I believe the pictures describe the rig better than my written directions.

I am an ardent disciple of *Organic Gardening*. "The proof of the pudding is in the eating", and we do appreciate the high quality of our vegetables.

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Lilium Superbum

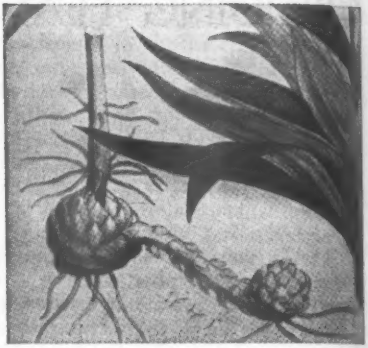
By

EDWARD R. WALSHAW

LILIUM superbum, the American Turks Cap, or Swamp lily has rightly been called the showiest of American lilies. Also called tiger lily, its beautiful nodding orange blooms peep out of every thicket and surround every lowland meadow from late June to the beginning of August. Although called swamp lily, L. superbum is never found where water will cover its peculiar dumbbell shaped bulbs. Look for L. superbum where the ground is moist, but also where it is well drained.

From November 1, till the ground is completely frozen is the best time of the year to plant a bed of these tall native North American beauties. Mark out a space as large as you wish your bed to be. Remove all the dirt to a depth of a foot and a half. Now get some good rich topsoil and mix with it about twenty percent compost. Stay away from chemical fertilizers, and be sure the soil is on the sour side, as L. superbum does not care for lime. A little bone meal would not be amiss, but I have had the best results with plain compost and humus. Throw in plenty of good old fashioned autumn leaves. L. superbum delights in them. If your soil is on the clayey side, it will be well to surround the newly planted bulb with pure sand.

After the bed is dug out, and the soil prepared, fill it up to a depth of six or eight inches from the top. Firm it down, and you are ready for your bulbs. Set them eight inches to a foot apart, and cover them with the rest of the soil you have dug out of the bed. When the ground is frozen, cover the whole bed with a six inch layer of autumn leaves or old hay, and lay some old boards over these to hold them in place. These lilies are not injured by freezing; it is the mechanical action of alternate freezing and thawing during the late fall and early spring that is fatal to them.



Bulbs and offset of L. superbum

When the ground has thawed in the spring, carefully remove the winter covering, carry it to your compost pit, and set out pansies, petunias, or any low growing plant among the young lilies. These annuals do a real service to the lilies, they cover the ground, and keep the bulbs cool by protecting them from direct sunlight, also preventing evaporation of too much moisture from the bed.

I once had a beautiful clump of tiger lilies growing in a bed of peonies. The tall graceful lilies towered three feet above the peonies, but their thin wirey stalks could cast no shadow to harm the peonies, while the dense low growing peonies provided almost the exact conditions that make L. superbum grow so happily in the wild.

If you are able, the best way to get your lilies is to go out into the country and hunt for good specimens. You will find them along the roadside, and in the not too dense thickets surrounding old meadowlands. It is easy to recognize L. superbum at this time. The tough stalk, now a dark brown will be standing stiffly erect holding its seed pods, empty now, in a rough caricature of last summer's beauty.

You will need a sharp spade to dig L. superbum. She will be deeply placed, and in an almost inextricable tangle of her own and other roots. Push your spade straight down on all

sides of the bulb, cutting through all the tough roots of bushes, etc. which share the same ground as the lily. You will have to push the spade to the very shoulder, as L. superbum is a deep grower. Now remove the mass you have loosened. Shake it gently to dislodge most of the dirt so they will not be so heavy to carry. Never try to pull the curious double bulb out of the tangle. It is about as tender to the touch as the inside leaves of iceberg lettuce, and just as easily broken. Plant your bulbs as soon as you get home, using the old stalks to tell you how deep to plant them. The following spring, they will begin growth as if nothing had happened, and if your bed is as good as the place where you took them they will increase and multiply through the years, gaining greater beauty with every summer.

I like to walk through the country in summer, during the blooming season of the lilies, and mark with a little willow stake and a white rag the plants I want to gather for my collection. In this way, they are easily found when I may have forgotten their exact location.

Plants of many species may be added to your collection in this way, including the lovely delicate lady slipper. Mark them and choose them when they are in the full beauty of their bloom, and collect them in the late fall while they are dormant, and you will have nearly one hundred percent survival in the spring.

Some states, however, have laws prohibiting the collection of the wildings, and it would be well to consult your local game warden, or conservation officer. It is a wise plan to get the permission of the land owner, too. In ninety-nine cases out of a hundred he will welcome you and tell you to go ahead, but if he finds you digging without permission, there is more than likely to be some unpleasantness that can only end with your apologies and ignoble retreat.

Lilium superbum

SEMINAR ON

INSECTS

INSECTS are the most numerous group of animals on the earth today. There are more kinds of insects than all other animals put together. They are masters of transportation and abound everywhere—in the air, on the soil, in the ground, on the water, and in the water. Insects must be understood to be controlled. It is important to know their identity, their food habits, their breeding habits, and their natural enemies. The best method of control consists in establishing and maintaining the biological balance which Nature has long since designed. As any kind of insect increases unduly to upset this balance, its predators (animals which eat it) increase correspondingly and soon reestablish the biological balance.

The young of some insects are not unlike the adults in appearance and are called nymphs, as in the grasshopper. The young of most insects, however, are widely different in structure and appearance from the adult and are called larvae. The larvae of some groups of insects are given special names. For instance, the larvae of butterflies and moths are called caterpillars, those of flies are called maggots, and those of beetles are called grubs.

Some insects, as aphids, have sucking mouth parts which enable them to suck the juices out of plants. Other insects, as grasshoppers, Japanese beetles, and bean beetles, have chewing mouth parts which enable them to bite off pieces of plant tissue and eat them to be digested inside the insect's body.

Insect Control

Plants which become diseased or are attacked by insects are either growing out of harmony with their environment or are nutritionally unbalanced. Diseases and pests are Nature's censors and are indicators that something is wrong with our cultural practices.

Regardless of the methods used, it will never be possible to get insects under complete control. The most important natural control measures include mixed culture, a completely fertile soil rich in humus and all the nutrient elements, proper spacing of the plants, time of planting, sanitation, good cultural practices, adapted varieties of plants, and predators.

Nature invariably grows her plants in mixed culture. Some beneficial associations are cabbage and hemp as the odor of the hemp is a deterrent to the cabbage butterfly; cabbage and beans; beets and onions; celeriac and leeks; cucumbers and sweet corn. Radishes with a border of garden cress are very tasty.

The cabbage maggot, for instance, can be largely avoided by sowing the seed and growing the seedlings either before or after the adults of this insect are on wing.

Good cultural practices also include a living soil well supplied with plant nutrients, good sanitation including the removal of all plant residues to the compost heap, proper spacing of the plants to insure good air drainage, the planting of well adapted varieties for a particular environment, and the encouragement of such beneficial animals as toads, insect-eating birds and bees.

The home gardener should plant a little more of each kind of vegetable than he actually needs to allow for some losses from insects and diseases, but in no case should he use poisonous sprays or dusts to protect his plants. By adopting the natural control measures suggested above and having enough faith in them to use them year after year, the losses from pests and diseases will become too insignificant to warrant the use of poisons. If a gardener should be one of those souls who must have everything looking perfect, he should not plant the more

susceptible kinds of plants. In the case of truck gardeners who make their living by growing food plants, the problem is somewhat different and research must be done to find safer methods of control.

Typical Discussions with Our Readers

Q. I am at a loss to understand how compost can keep insects from devouring the leaves and other parts of plants. Has this been proven?

A. Yes, in quite a number of instances which are reported in *Organic Gardening* magazine from time to time. Proper nitrogen and potash fertilization, such as should be supplied by compost, increased resistance to several fungi and insect pests. Orrin Hale of *Northwest Gardens and Homes* made a similar report, and *Science* gave out Experiment Station news about New Zealand spinach well-fed with nitrogen.

Q. If one should not use sprays to protect the garden against the various pests, is there anything one *can* do while waiting for the compost to bring the soil back to the point where pests will not be troublesome, to protect our gardens against cabbage worms, cut worms, wire worms, and other insects? Add aphids and nematodes to this list, and you know what we are up against in trying to raise our own vegetables in our back yards.

A. When you consider that mankind not only raised vegetables and fruit, but originally bred the varieties we now enjoy long before the epoch of chemicals, you will agree with us that nature must have its own check against destructive pests. The best method of control involves the encouragement of the natural enemies of the pests—lizards, toads, frogs, birds, and predaceous insects. The spiders also are very helpful in catching flying insects and should be protected.

Ants

Q. I am troubled with red ants in my garden, and am using cyanogas to get rid of them. I find, however, that this gas poisons my plants and the soil. How can I get rid of the ants without poisoning the soil?

A. We would not recommend the use of cyanogas for exterminating ants, as this will ruin your soil. When you get your land rich organically, you will find that the ant problem will take care of itself. Organic matter in the soil increases its moisture content and makes conditions less favorable for the ants. Ants are really beneficial in the compost heap and in the soil as they increase aeration. They seldom injure plants. They sometimes carry aphids from one plant to another. This can be prevented by banding the plants and trees with some suitable non-poisonous material.

Aphids

Aphids may be controlled by first practising sanitary measures. Do not crowd plants so that they are not well exposed to sunlight and air. Then use plenty of compost in growing plants that are susceptible to aphids. In most cases bad infestations of aphids can be prevented by watching the plants closely and removing infested leaves and putting them in the compost heap. Mycorrhizal fungi, which live in soils rich in humus, seem to feed the plants substances which make them relatively resistant to aphids.

Bagworms

If only a few shrubs or small trees are to be considered in the control of bagworms, hand-picking and destruction of the cocoons during the winter months will be all that is required to prevent damage during the following season. The young caterpillars migrate with great difficulty and will not reinfest any tree to a serious extent in one season.

Bean Weevil Control

Q. I am enclosing beans which I believe to be infested by bean weevils. How may bean weevil infestation be prevented?

A. Bean weevils attack the matured seeds of beans after they are harvested and put into storage if they have not been properly cured. This

can be prevented by curing the beans before they are shelled and stored. When the beans are ready to be harvested, pull up the plants with the pods on them and put them on stakes to hold them off the ground to cure. The curing process involves certain biological changes including fermentations and the production of heat; this requires six weeks or longer. The cured beans may then be shelled and stored in a dry place without danger of weevil damage.

Cabbage Butterfly

The common cabbage worm is the larva of the white cabbage butterfly. The adults emerge from over-wintering pupae in the spring and each lays several hundreds of eggs on the under surface of the leaves of cabbage plants. The eggs hatch promptly and develop into a velvety, green caterpillar with a narrow orange stripe down the middle of the back. These ever-hungry caterpillars grow rapidly and develop into adults. There may be as many as five or six broods during a single summer. The best control measures of this insect include proper spacing of the plants, soil richly supplied with compost, and birds which feed on them. Occasional plants which seem unable to resist the worms should be treated with common table salt.

Cabbage Maggot Control

The cabbage maggot is the larva of a fly. This insect can be prevented from infecting cabbage plants by placing a cardboard disc around the plant at planting time. Or seedlings and young plants can be grown in flats that are screened to prevent approach of the adult flies. Another important control measure consists in setting the plants out at a time when the flies are not on wing.

Control of Small Caterpillars

Q. We are troubled by minute caterpillars which eat the buds of the flowers as they form. What is the best method of dealing with them?

A. Small caterpillars can best be controlled by encouraging and protecting native birds which eat caterpillars. Protect the birds from cats and other enemies, and provide bird houses in which they may rear their young.

Centipedes

Q. Can anything be done to control centipedes? I find them under rocks and I read that they are the enemies of earthworms.

A. Centipedes must be classed as beneficial organisms. They feed on insects, worms, mollusks, and other small animals, many of which are injurious to plants. They destroy many injurious insects, slugs, and perhaps a few earthworms. In a different way they are as beneficial as earthworms. Protect them rather than harm them.

Corn Borer

The European corn borer was introduced into the United States and discovered in 1917. The most effective and simplest method of controlling the corn borer consists in removing the cornstalks cut off at the ground level as soon as the crop has matured and is harvested. The corn borer is inherently fragile in its early larval stages. Investigations indicate its mortality to be as high as 95 per cent.

Natural parasites of the corn borer are the protozoan, *Perezia pyraustae* and a wasp, *Pyrausta crassifemur.*

Cucumber Beetles

Q. I find a striped bug on my cucumber leaves. Is there anything I can do against it?

A. The insect you refer to is probably the striped cucumber beetle. We have not been bothered with them since using compost. A recommended method of control consists in mixing a handful of wood ashes and a handful of hydrated lime in two gallons of water and spraying both under and upper sides of the leaves. This treatment does not kill the beetles but does seem to drive them away.

Cutworms

Q. How can cutworms be controlled without adding poisons to the soil?

A. Cutworms chew plants off more or less completely at the ground level. They do this damage to plants at night, and usually hide beneath soil or other shelter during the day. A simple device for preventing damage to plants is to place a paper collar around the stem extending for some distance above and below the ground level.

Cutworms are becoming more and more plentiful because toads and other insect-eating animals are becoming increasingly scarce. These cutworm-destroying animals are killed by eating poisoned insects. Some gardeners keep a half dozen bantams in the garden for keeping cutworms under control.

Earwigs

Earwigs are chewing insects which look something like beetles in their hard wing covers, but may easily be differentiated from beetles by the pincer-like appendages at the tail end of the body. These insects are troublesome pests in the South and West. They feed on the petals of flowers and tender fruits and vegetables. They can be controlled by the use of one of the recommended poison baits.

Flea Beetles

Flea beetles are extremely small and feed on the cotyledons and leaves of seedling plants. By planting the seed thick and thinning after danger of flea beetle damage is past, a full row of vegetables can be grown. Thinning must be done before crowding prevents good circulation of air about the plants.

A lady from England has just told us that she can control flea beetles using equal parts of old soot and agricultural lime which emits an odor that repels the beetles. This mixture should be put in small containers rather than on the soil or on the plants. Another reader reported that flea beetles can be driven off by placing over the rows of plants bruised elderberry leaves.

House Flies

House flies may best be controlled by eliminating their breeding places. Devices for reducing their numbers are tanglefoot fly papers and electric fly killers. Do not spray with DDT as this will lead only to the origin of a DDT-resistant strain which is even worse than the regular flies.

Grasshoppers

Q. Will you please advise what may be the best method of eliminating grasshoppers from lima beans? They seem to have a very fine time eating the blossoms from my plants.

A. Grasshoppers can be baited by various baits laid out in the morning; but a sound non-chemical method consists in the use of buckets or tubs with water and a light placed nearby. Thus one gets grasshoppers that can be fed to chickens. It is well also to encourage birds which eat these insects.

Grasshoppers lay their eggs in soil not covered with plants. Keeping a good ground cover goes a long way in preventing egg laying in your soil.

One of our readers harvested no corn from the three rows next to a fence. The following year this farmer and his son built and put up 20 birdhouses in the fencerow. The following year corn was again planted in the same field and the three rows next the fence yielded 23 bushels of corn. He felt that the birds were responsible for the protection of the corn along the fence.

Japanese Beetles

Japanese beetles were first discovered in this country in 1916. When and how they were introduced is unknown. It is a native of Japan where it is not a serious pest due to the cultural practices used there and the presence of its natural enemies. It has become a serious pest in this country because its natural enemies are not here to keep it under control. Natural enemies are being introduced, however, and in time it will be brought into balance. Among the most important control organisms are the "milky disease" of the larvae and certain parasitic wasps.

On the *Organic Gardening Experimental Farm* the Japanese beetles have been successfully appeased by

growing non-food plants which it seems to prefer above all other plants —the *odorless* marigold. When planted next to corn, the beetles did not chew off the corn silks. They can also be trapped with traps baited with geranium oil. Geranium plants may also be grown in the garden which, when eaten, will kill the beetles.

Leaf Miners

Q. How can we control leaf miner?

A. The leaf miner can be controlled fairly well by practicing sanitation. Be sure that all waste plant materials and other objects under which these insects hide and hibernate during the winter are cleaned up and placed in the compost heap. One plant in particular which serves as a host for the leaf miner is lamb's quarter (*Chenopodium album*).

The leaf miner should become less a problem as your soil becomes richer in humus and the essential nutrient elements. Such plants are lower in carbohydrates and less palatable to these insects.

Mexican Bean Beetle

The Mexican bean beetle was first reported as a pest in Colorado nearly a hundred years ago. Since then it has moved eastward until it is now common throughout the entire East. It is a member of the ladybug family. It and the squash ladybug are the only two plant-eating ladybugs known in this country. The adult beetles hibernate and wake up in spring for the first planting of beans. Winter mortality in northern regions is very high, reaching 98 or 99 per cent. When they appear in spring they attack beans of all kinds, but prefer the bush varieties of string beans.

Hand-picking the adults which succeed in passing the winter is the simplest and best method of keeping these insects under control. They have few natural enemies. Some ladybugs feed on the eggs and young larvae of the bean beetle. Ground beetles have been observed to feed on larvae. One parasitic fly is known but has not yet been established in the new range of the insect.

With care, home gardeners can control the bean beetle by picking off the first adults. Commercial bean growers may be froced to use rotenone.

Mites and Spiders

Mites and spiders are usually best controlled by maintaining a proper balance of organisms. Do not use poison sprays as they usually kill the enemies of mites and spiders but do not kill mites themselves. Under such circumstances, mites become a serious menace to our crop plants. We have many indications that plants grown with plenty of humus are relatively immune from damage from mites.

Mosquitoes

Mosquitoes may be controlled by draining stagnant bodies of water or by floating on them a thin film of oil. While this may be somewhat injurious to vegetation, it is not as dangerous as DDT or other poisons. Often rain barrels and other containers with water offer the mosquitoes breeding places.

Moths

Moths may be trapped, but the traps must be in operation when a particular moth is on wing. Each kind of moth has a partitcular season when the adults are on wing and attack plants. Many kinds of moths are nocturnal in their habits.

As to the brown-tail moth, the winter webs may be collected by hand and destroyed. In the case of both bagworm and the brown-tail moth, rotenone may be used on non-food plants in extreme cases.

Nematodes

Many cases have come to our attention where the consistent use of compost has eliminated nematodes. Sir Albert Howard described a case where nematodes were killed out merely by the application of humus. No chemicals should be used for their extermination, as this will interfere with the proper functioning of beneficial soil organisms which tend to keep all dangerous microbes and nematodes in check.

Scales

Scales are usually small, parasitic, sucking insects which attach themselves to plants much as oysters attach themselves to the bottom of the bay in an oyster bed. As a matter of fact one scale, the oyster-shell scale, is named from its resemblance to an oyster shell. Scales can be controlled by spraying trees and shrubs, *while in the dormant condition,* with a 3 per cent oil spray. This kills the scale insects by forming a film over their bodies which excludes oxygen needed by them in respiration. The oil is not poisonous and will damage neither plants nor the soil.

Slugs

At least two species of garden slugs may become troublesome in the garden. The more common is the gray field slug; the other one is the giant or spotted garden slug. These animals hide under rubbish during the day and feed at night on tender leaves of many garden plants, leaving a slimy train where they have crawled. Jelly-like eggs are laid in the fall and spring in the soil or under stones, sticks, and clods of earth. Slugs may be trapped beneath shingles or other pieces of board and then killed. Plant and flower beds may be protected by sprinkling hydrated or air slaked lime or wood ashes on the soil, as slugs and snails do not willingly crawl through dry materials. Proper garden sanitation, as removing all rubbish and plant materials to the compost heap, will help to control slugs. Do not use poisonous chemicals.

Sowbugs

Q. Please tell me how to get rid of sowbugs or pillbugs.

A. The best way of ridding your garden of sowbugs is by encouraging toads and lizards. By constantly enriching your land with compost, eventually some reasonable equilibrum will be established by the processes of nature. Sowbugs usually live in decaying organic matter and help to form humus. In the compost heap sowbugs perform a noble service.

Sowbugs prefer a somewhat acid medium. One reader reported that when he made compost without lime, he was visited by sowbugs, but when he used lime in the compost heap the sowbugs disappeared.

Squash Bugs

The squash bug can be discouraged by keeping the squash plants dusted with wood ashes. If applied early in the morning when the leaves are wet with dew, the ashes will adhere to the leaf surfaces. Be sure to keep the leaves dusted until the plants are old enough to resist the squash bugs.

Tomato Worm

The tomato worm is the larval stage of one of the fast-flying sphynx moths. The worms match in color the green of the leaves so that they escape casual observation. The best method of control is hand-picking. They spend the winter in the pupa stage deep in the soil, emerge in the spring as adults, lay their eggs on the lower surface of tomato leaves. The eggs hatch into the tomato worm which reaches a mature length of about three inches.

Web Worms

This is a general name for a variety of widely distributed caterpillars which feed under the protection of a silken web. The *fall web worm* feeds on the leaves of many kinds of trees and sometimes more or less completely defoliates them. The *garden web worm* prefers clover, alfalfa, and other crop plants. These larvae grow to maturity under the webs and then pupate under trash on the ground or under the bark of trees. The best control measure is the practice of sanitation. Remove from infested plants all webs and put them in the compost heap where they will be killed by the heat of fermentation. Clean up all debris around the trees and gardens so that the larvae will not find suitable places to form their pupae. Also spray the trunk and branches of trees with a tree paste made of equal parts of fresh cow manure and clay diluted in water sufficiently to pass through a spray nozzle.

Wire Worms

Wireworms live in acid soils which are not properly aerated. As a matter of fact, wireworms are good indicators that the soil has become acid through improper aeration. Wireworms often occur in great numbers in an old sod where they live on grass roots. The soil under the sod is poorly aerated and somewhat acid. The wireworms help to convert the plant roots into compost.

To control wireworms, aerate the soil and enrich it with compost. Soil organisms in the compost will bring the wireworm under control. It is poor practice to plant a cultivated crop in a field that has had sod on it for a long time as wireworms will be sure to cause trouble under this practice.

The aeration of the soil can be increased or even made ideal for plant roots and soil organisms by breaking the hardpans in the subsoil. On a farm scale this can best be done by the use of a subsoiler, by planting deep-rooted cover crops or other crops, and by increasing the organic matter in the soil so that it will contain a numerous population of earthworms which will do the subsoiling. In the garden, the hardpans can be broken by "trenching." This consists in digging a deep trench and throwing the soil up on the surface. Then this trench is filled by digging a second trench along side. This is continued until the entire garden is trenched. Finally, the last trench is filled up with the soil taken out of the first trench.

Dr. William H. Eyster

GARDEN CALENDAR—OCTOBER

October, for plants, is a season of fulfillment and of preparation for the winter. Fruits and seeds are ripening, twigs are hardening, and buds are hardening and being covered with hairs and waxes to insulate them against the conditions of winter which are unfavorable to growth in many parts of the United States. Mother Nature has long since taught plants to store food to keep the slow fires burning during the winter and to make possible the rapid growth in Spring that provides the earth's surface with a new green carpet. A seed contains a baby (embryo) plant with enough food to enable it to grow large enough to shift for itself. Buds represent entire branches with leaves and flowers already formed so that all that is necessary in Spring is the absorption of enough water to unfold the leaves and flowers.

Help Nature with her winter care of your plants by cleaning away all dead plant material to the compost heap, and then cover your perennial and biennial plants with a suitable mulch, especially in parts of the country where Nature's mulch (snow) does not blanket the earth during the entire winter. Garden equipment should be cleaned, oiled, and stored in a dry place. Be careful also to gather and store plant stakes so that they may be used next year.

Complete the gathering of seeds from your late-flowering annuals and perennials. Store them in properly labeled envelopes. Seeds from plants grown in soils rich in organic matter are better than any you can buy in spite of the beautiful pictures in the catalogs.

THE NORTH

Preparation of the Soil for Winter. Remove all plant residues to the compost heap, level off the soil, and feed the soil organisms by working into the surface layers of the soil plant and animal residues which will be converted into compost by Spring. It is desirable also to cover the surface of the soil with a weedseed-free mulch. This will enable you to prepare the soil earlier in the Spring. Or sow winter rye which will provide additional organic matter to be worked into the soil in the spring.

Fall Planting. Shrubs, trees, and hardy perennials may still be planted in all but the northernmost States. Bulbs of tulips and lilies should be planted this month.

Preparation of Plants for Winter. Rhododendrons and azaleas should be mulched with leaves. In the northern states Hybrid Tea Roses should be hilled up with soil 12 to 15 inches deep before the ground freezes. After the ground has frozen, cover the roses with hay, evergreen boughs, or other plant materials that will not pack too closely. Climbing roses should be laid on the ground and covered with from 3 to 6 inches of soil and a little mulch over the soil. Pot and move inside any plants that you want for your winter garden. Give the evergreens a good soaking with water. Store your root crops for the winter table and the roots and bulbs of flowering plants in a cool, dry place; preferably in dry sand. Bulbs or roots of spring-blooming plants may still be put into the soil.

THE WEST COAST

Fall Planting. This is bulb-planting time west of the Rockies. Exercise great care in the selection of bulbs for planting. Make flat-bottomed holes so that the entire base of the bulbs is in contact with the soil. Bulbs which appear to be dry should be soaked in water a few hours before planting. Care must be taken that the stem end of the bulb is oriented upward. I mention this because I know of more than one person who planted their bulbs upside down with unsatisfactory results. If gophers are a pest in your region, the roots of oriental poppies as well as the roots and bulbs of other plants should be protected by the use of wire screen baskets. Anemone and Ranunculus roots should be soaked in water until they are plump before planting.

THE SOUTH

The Lawn. If you have not already done so, you should plant your evergreen lawn without delay so that it may be well established before freezing weather. For best results use Italian rye grass mixed with some Dutch white clover. This seed mixture may be sown in a Bermuda Grass lawn which has become brown, but the dead Bermuda grass should be raked off first and the ground given a good application of finely sieved compost to be worked into the soil with the seed mixture. By following these directions you will have a beautifully green lawn during the winter and spring months.

The Flower Garden. This is the best month for planting spring-blooming bulbs, corms, and roots. For best results with pansies, use northern-grown seedlings. If planted this month they will bloom profusely in January. Delphiniums, which behave as annuals in Florida, should be planted this month. Poinsettias should be staked to prevent them from wind damage. Give the Dahlias a liberal application of compost to insure the best possible burst of bloom in November.

The Vegetable Garden. All cool-season vegetables may be planted this month. To give them a good push before cool weather, put an inch of compost in the bottom of the seed furrow and sow the seed along side the compost. Hotbeds and coldframes should be made ready for use next month.

THE LOWER SOUTH *

Flower Garden. October's list of flowers should be varied enough to suit any taste. Plant alyssum, ageratum, arctotis or African daisy, aster, baby's breath, centaurea, or the familiar bachelor's button, balsam, blue lace flower, calendula, calliopsis, candytuft, carnation, cynoglossum or Chinese forget-me-not, Shasta daisy, dianthus, gaillardia, helichrysum or strawflower, lupine, nasturtium, pansy, phlox, California poppy, petunia, Queen Anne's lace, salvia, scabiosa, snapdragon, sweet pea, statice, verbena, periwinkle. Of course many will want to raise those flowering plants that grow so quickly and satisfactorily from a cutting. Gardenia, allamanda, the various colored hibiscus, bougainvillea, angel trumpet, rose, among others. Cuttings, usually started in sand, make rapid progress on top of a compost heap that has become ready for use. In this soil they can be watered freely without being flooded, as the surplus moisture disappears quickly, and plenty of plant food is assured.

Vegetable Garden. If not already set out in September, set runners or new strawberry plants this month. A batch of acid compost should be waiting to use in the bed. Best varieties for this section seem to be Missionary and Blakemore. Plant also: bush beans, beets, broccoli, Brussels sprouts, cabbage, Chinese cabbage, carrot, cauliflower, celery, collard, endive garlic, kale, kohlrabi, leek, lettuce, mustard, onion, seed and sets, parsley, parsnips, peas, pepper, potatoes, radish, rhubarb, romaine, rutabaga, spinach, Swiss chard, turnip. Two new varieties of tomatoes, from the Laboratory at Bradenton, maintained by the Agricultural Experiment Station, are being tested. Only a small quantity of seed is available at present, and only for those, interested in making tests, as it has not been raised in sufficient quantities yet to be in the market. The names are Manahill and Manasota. A trial in three different plots by the writer, using Marglobe as a check plant, indicated that the Manasota was the best performer, averaging better shape and less tendency to crack around the stem than the Manahill. Neither of the three varieties showed any tendency to disease. One plot consisting of mostly compost, and planted in half shade, (in summer) had a much longer bearing season than the others, and with no trouble caused by sun scald.

Trees and Shrubs. The Australian pine, which has become so popular in Florida makes an excellent windbreak and is a fine appearing tree. Its main fault seems to be a tendency to run long roots not far from the surface, and from which many new trees start. For this reason it should not be planted near the garden. It is a quick grower.

THE SOUTHWEST **

October is filled with busy planting days so as to get the benefit of the warm fall weather before the night temperatures drop below 50° F. and the days become shorter.

Flower Garden. Now is the time to rush in the annuals for winter blooming, sown earlier in the season, both by home gardeners and local nurseries. Set calendulas, Iceland poppies, tetra-snapdragons, stocks, pansies, violas and primulas, especially *P. malacoides* and *P. obconica.* Sown where they are to bloom, scarlet flax, golden African daisies, poppies, larkspurs, and other deep-rooting annuals which resent transplanting, can be broadcasted or sown in rows.

October is the main bulb planting month for Southern California and Arizona. Plant deeper than for eastern conditions. Narcissus of all sorts can be put out; Dutch iris, *Scilla campanulata,* South Africans and natives can be rushed in the first of the month. Ranunculus and anemones can be planted in plant bands to prevent destruction by slugs, snails and birds. Refrigerate your

* Edwin H. Abrams, St. Cloud, Florida
** Charlotte M. Hoak, 1125 Stratford Ave., So. Pasadena, Calif.

tulip bulbs as soon as you get them and plant them in November. Early planting of tulip bulbs results in short stems and poor foliage. Enrich your soil with bone meal and good compost. Do not use animal manures unless they are well rotted or composted. Ground covers should not be forgotten. Broadcast seeds of sweet alyssum, baby-blue-eyes (nemophila), Virginia stocks, cream-cups and nemesia. Set in plants as violas, pansies and cream-cups. Perennials grow too vigorously to make good ground covers. They are better used as backgrounds and edgings in our gardens. Lilies of the hybrid types, grown in the Pacific Northwest, are the best for our western gardens. Try the Bellingham and Olympic hybrids and a host of others which are being offered. *Lilium Henryi* and our native tiger lilies will stand anything in the way of garden hardships.

Perennials of all sorts may be set to make strong fall and winter growth for spring blooming. Delphinium, Pacific hybrids, pentstemons, stokesia, columbines, coral bells, *Bergenia crassifolia,* Scotch pinks, gaillardia, geum, Shasta daisies, rudbeckias and rehmannia are among the best. Such biennials as foxgloves, hollyhocks, sweet williams and canterbury bells benefit by early planting.

October is one of the best months to plant new lawns and renovate old ones. Waste from old Bermuda lawns makes the finest kind of compost. Dichondra is one of the most popular lawn substitutes. Mulch with well rotted cow manure or compost. Grow a crop or two of weeds to turn under before planting unless you want "on all fours" exercise.

Cover crops should be planted on all unused garden plots and in orchards. *Melilotus indica* and oats mixed with purple vetch are excellent.

Vegetable Gardening. Continue planting strong plants of winter vegetables such as cabbage, cauliflower, kale, kohlrabi, Italian sprouting broccoli, celery, seedling onion, romaine, and leaf and winter head lettuce. Chinese edible pod and telephone peas, as well as Windsor beans can be planted the last of the month. Set chives and parsley in the herb garden. Sow in well watered rows, seeds of beets, carrots, chard, Chinese mustard, Southern curled mustard, Chinese radish, radish, cos lettuce, head lettuce, white turnips, and yellow turnips, the first of the month. Mulch thoroughly and top sprinkle until the seeds germinate. Soaking carrots and beets hastens germination. Use radishes as a nurse crop for carrots.

Trees and Shrubs. Hardy evergreens both broadleaved and conifers, may be planted at this time. October is an ideal time for planting native trees, shrubs and perennials. Avoid planting tropicals and semi-tropicals unless you are in a reputed, frostless belt. Withhold late fall watering from tender material. Be sure that your deciduous things, both fruits and flowering trees, and shrubs, are not neglected. Drying out at this period means less fruit and fewer blossoms for the coming season.

ROOT SYSTEM OF BEANS

By DR. PAUL SCOTT

IN early growth, the bean develops a taproot with very abundant horizontal lateral branches, while many secondary roots arise from the base of the stem. The root system is conical in shape, the base of the inverted cone beginning about 2 inches below the surface of the soil. During the 5 weeks following, about eight strong lateral roots spread 2 feet or more in

the upper foot of the soil, branching profusely. Then turning downward, they end their growth in the second or third foot of the soil. Large numbers of smaller laterals fill the soil near the taproot. The taproot is also covered with long laterals almost ro its end which greatly increase its absorbing surface.

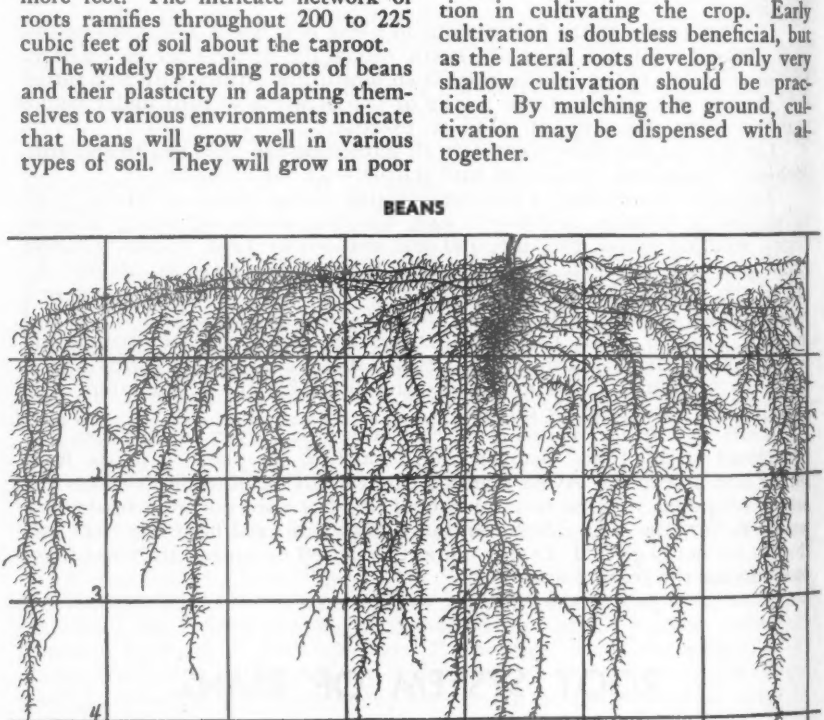
By the end of the blossoming period, the root system has made further marked growth. Widely spreading, nearly horizontal branches run outward 2 to 4 feet from the taproot. These lateral roots then grow downward, branching as they go, and may penetrate the soil to a depth of 4 or more feet. The intricate network of roots ramifies throughout 200 to 225 cubic feet of soil about the taproot.

The widely spreading roots of beans and their plasticity in adapting themselves to various environments indicate that beans will grow well in various types of soil. They will grow in poor soil better than most other plants because they have nitrogen-fixing bacteria associated with their root systems.

Since beans pull the cotyledons out of the soil, thorough preparation of the soil and good tilth of a well compacted seed bed are essential. A deep mellow soil promotes deeper root development and at the same time insures a more thorough penetration of the richest portion of the soil. This is due in part to better aeration and increased water-holding capacity of the soil.

The closeness of the roots to the surface must be taken into consideration in cultivating the crop. Early cultivation is doubtless beneficial, but as the lateral roots develop, only very shallow cultivation should be practiced. By mulching the ground, cultivation may be dispensed with altogether.

BEANS



Hints for the Flower Garden

PERENNIALS THAT SHOULD BE GROWN FROM CUTTINGS

Some perennials are hybrid in nature and thus highly unstable. The choicest plants often were selected from thousands of plants for color, size, shape of flower, general habit of plant, substance of flowers, length of blooming period, floriferousness, and other desirable characteristics. When these plants are propagated by seeds, as a rule the offspring are highly variable with most of the plants inferior to the parent plant. Among the common plants which should not be propagated by seeds are Astilbe, aubretia, campanula, chrysanthemum, erigeron, gaillardia, geum, helenium, helianthemum, heliopsis, heuchera, lythrum, monarda.

~+~

FRAGRANCE

Fragrance is a quality that should be a part of every flower garden. Just as the brilliant and harmonizing colors of flowers are pleasing to see during the daylight hours, the ethereal oils of the flowers emit fragrances which make the twilight and evening hours in the garden a paradise. As nature pulls down the curtain in the West and the light of day fades out, the garden's appeal changes from colors to fragrances. Make certain that your garden includes fragrant herbs, annuals and perennials, shrubs, vines and trees. Space here does not permit a list of fragrant plants.

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INCREASE THE BLOOMING PERIOD

The blooming period of your favorite plants can be prolonged by making successive plantings. Gladiolus, for example, can be kept blooming all summer long by making plantings at two-week intervals. Marigolds, zinnias, and other annuals which thrive in hot, sunny weather may also be planted in succession to prolong the blooming period from early summer to late fall.

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BLUE-FLOWERED PERENNIALS

Of all the colors of garden flowers, blue is the rarest and most sought after. Blue-colored flowers are much needed in our flower garden. Striking effects may be used by using only blue-flowered perennials. Among the best suited blue-flowered perennials now available are Campanula, delphinium, echinops, eryngium, blue iris, linum, nepeta, platycodon, polemonium, tradescantia, and veronica. Dispersed among these plants should be plants with silvery or gray foliage, such as artemesia, stelleriana, cerastium, Stachys lanata, and veronica incana.

~+~

PERMANENT FORMAL BEDS

Certain plants are adapted for permanent formal beds because of their neat growing habits and attractive foliage which persists after the flowers are gone. Some of the more common plants of this kind are Armeria, dwarf asters, astilbe, chrysanthemum, geum, heuchera, hosta, limonium, primula, trollius, and veronica.

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LILACS

Lilacs almost demand neutral or slightly alkaline soil. If you have not done so recently, you should give each lilac bush an application of pulverized raw limestone. It is worthwhile also to give consideration to the many new varieties of lilacs which are now available. By a careful selection of varieties the flowering season can be extended over a long period that begins before the old-fashioned type is in bloom and continues until early summer.

Hints for the Vegetable Garden

CONTROL POTATO SCAB

Soil low in humus must be extremely acid to minimize the damage of the tubers by the potato scab organism. Experiments carried on during the past two years indicate that potato scab can be controlled by increasing the humus content of the soil. When there is sufficient humus in the soil, potato scab will not develop even when the soil is alkaline with a pH of 7.2. It is essential that the compost be finished so that it does not contain too much raw organic matter when used.

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UNUSUAL BUT VALUABLE FOODS

Two legumes which deserve a place in the garden are lentils and mung beans. Lentils are semi-climbing legumes which produce small, flattened nutritious seeds which are used like dried beans. Culture like peas. They prefer sandy loam. It is said that the ancient Spartans fed them to their soldiers. They are rich in vitamin B and proteins. The mung bean (*Phaseolus aureus*) is a bushy legume which may attain a height of 40 inches and is highly prized in Asia for food and forage.

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MIXED GARDENS

The old-fashioned gardens of our grandmothers included vegetables, flowers, and kitchen herbs. These gardens were successful and beautiful too, and nothing more poisonous than wood ashes or a little slacked lime was used to discourage garden pests. A mixed garden is visited by a great variety of insects which tend to keep each other under control. A good balance among the animals which visit the garden is far more effective in control than the use of poisons which kill dozens of beneficial insects for each one that may do damage. Nature is so organized that every animal is a source of food for one or more animals. For instance, aphids suck the juices from plant cells and are the natural food animals of lady beetles. A natural method to control aphids would be to introduce lady beetles in the garden.

For the past two years a vegetable garden and a mixed garden were planted near to each other on the organic gardening farm. Only natural methods of control were used. Neither garden suffered excessive insect damage, but the mixed garden was more free from insect damage than the vegetable garden in both years.

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VINES IN THE GARDEN

There is a place for one or more vines in each garden. It is important, however, to pick the right vine for a particular place and purpose in the garden. For blocking out a tall, ugly wall or fence, try *Philadelphus mexicanus* (Mexican mockorange). Support it with wires and its long, pendulous stems, covered with creamy-yellow fragrant flowers will form graceful arches. For planting the top of walls, use *Clematis Armandii* which will trail along the top of the wall and grace it with masses of pure white flowers in early spring. A good trellis vine in protected places, as on south exposures, is *Clianthus puniceus* which has bright green, pinnate leaves and striking red flowers. This vine is also a gem for the corner of the patio or near the door. For covering stumps or giving color to tree trunks, plant *Passiflora manicata,* passion vine, which will thrill you with its bright scarlet flowers with blue crowns, and yellow-green fruits. Jasmine and crossvine, for the South, are taken for granted.

Shakespeare on Compost

By SHELIA PIM

(Reprinted with permission from *My Garden*, April, 1948.)

IN talking about "compost" I sometimes find myself using the word as if it meant only rotted-down vegetable and animal waste, as opposed to "fertilisers" bought in packets, whereas, of course, they are both fertilisers and a compost may be made of anything, even a *compote de fruits*. In my family we swore by the John Innes Compost for potting long before we began to wonder if we ought to abstain from it seeing that it contains superphosphates.

It would be interesting to know what Shakespeare implied in *Hamlet*, Act III, Scene IV, where he makes Hamlet say to the Queen,

"And do not spread the compost on the weeds,
To make them ranker."

Does the epithet "rank" suggest the unwholesome lushness of vegetation which some say is the first result of too much sulphate of ammonia? Or is this an allusion to the complaint that a dressing of vegetable matter which is insufficiently rotted down causes the spread of weeds? In short, did Shakespeare believe in muck and mystery or in artificials?

We may get further light on the poet's attitude from another passage which suggests that Shakespeare as a gardener had no puritanical prejudice against weeds. At any rate he provided an excuse for tolerating them. In *Henry V*, Act I, Scene I, the Bishop of Ely says,

"The strawberry grown underneath the nettle,
And wholesome berries thrive and ripen best
Neighbour'd by fruit of baser quality."

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Nettles are a valuable ingredient of the home-made compost heap, but unless you cut them before they seed, or get the heap well enough heated to rot the seeds down, you will have them all over the garden. This, perhaps, had happened to the Bishop's garden, through the carelessness of his henchmen, while he was away meddling in politics.

But the interesting part about these lines is that they seem to imply that Shakespeare believed in symbiotic relationships. That may not be the right term. A symbiotic relationship, properly speaking, exists between organisms of different kinds, such as plants and fungi. Whether "fruit of baser quality" can be stretched to cover fungi, or whether you can have a symbiotic relationship between different kinds of plants, are two moot points. Certainly the tidiest gardens do not always produce the best results, compared with some that to a casual glance seem to be completely smothered in weeds. One of the claims made for organic compost is that it favors the development of fungi. Toadstools are regarded by the muck and

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mystery school as an ornament to the well made heap. It seems as if Shakespeare was inclined to come down on their side of the fence.

In our experience strawberries have done better on organic compost made by the Indore method than on either farm-yard manure or basic slag. We even think it has cured our plants of the virus. Three years ago the old plants got it so badly that we should have thrown them out if we had been able at that time to get any that were guaranteed virus free. They had to be made do, and runners taken from them were planted in ground where compost was mixed with the top spit. Each year we raised fresh plants from runners. Each year some plants got the virus, but there was less of it year by year. Last year's runners, the third generation, show no sign of it so far, and what is encouraging is that they are the best runners we ever had, each with a good root spread, enough to fill a 5-in. pot. Nettles do well on this ground too.

Far be it from me to overstate the case for so-called "natural" compost. My godson, aged two and a half, was once taken to a demonstration by the late Sir Albert Howard. On coming home he plunged into the family compost heap and poured it on his head. His mother thought Sir Albert may have gone too far. But I like to imagine the subject providing Shakespeare and Bacon with Material for a discussion. One wonders what they use on the Elysian Fields.

Cleveland Organic Garden Club

Organic gardeners in Cleveland, Ohio and vicinity (Lakewood, Euclid, South Euclid, Cleveland Heights, Bay Village, Gatesmills, and Willoughby) interested in organizing an organic gardening club should contact M. L. Trivison, 1453 Elbur Avenue, Lakewood, Ohio.

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DIAGNOSTIC TECHNIQUES FOR SOILS AND CROPS by Herminie Broedel Kitchen et al. (The American Potash Institute, Washington 6, D. C. 1948 $2.00)

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THE COLLOID CHEMISTRY OF THE SILICATE MINERALS by C. Edmund Marshall. (Academic Press, Inc., Publishers, New York, New York. 1949 $5.80)

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Q. Is it a good practice to start a compost heap in the autumn?
F. S., Wankesha, Wisc.

A. Yes, a compost heap may be made at anytime of the year that materials are available. Plant materials are most abundant in autumn when there are weeds along roadsides; such garden residues as corn stalks, tomato and squash vines, and other plant wastes; autumn leaves; and many kinds of wastes from food processing plants. Compost made in the autumn will be ready for use in the garden in spring.

—o—

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Of ORGANIC GARDENING published monthly at Emmaus, Pennsylvania for October, 1949.

1. The names and addresses of the publisher, editor, managing editor, and business managers are:

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Editor—J. I. Rodale, Allentown, Pa.

Managing Editor—Dr. Wm. H. Eyster, Emmaus, Pa.

Business Manager—J. I. Rodale, Allentown, Pa.

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3. The known bondholders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) NONE.

Signed, J. I. RODALE, Publisher

Sworn to and subscribed before me this 8th day of September, 1949.

Elmer A. Barto, Notary Public
My Commission Expires Jan. 7, 1951

proaches and let the organic materials finish composting in the soil?

H. E. B., Elkhart, Ind.

A. Yes, raw organic matter may be disced in the soil providing there is time for its complete decomposition before a crop is planted in the spring. The surface of a fall-disced field or garden should be covered with a mulch or planted with a cover crop to protect the soil from erosion and the soil organisms from injury as a result of the alternate freezing and thawing of the soil during the winter months.

—o—

NATURAL ROCK FERTILIZERS

Q. Is it necessary to apply the pulverized but otherwise untreated rock fertilizers each year as is done with the highly processed commercial fertilizers?

H. J. R., New Orleans, La.

A. No. Finely pulverized rocks containing plant nutrients are insoluble when applied in the soil. They are made soluble by the soil and root acids, and in sufficient amounts to meet the needs of the plants. Being insoluble, the nutrients will not be leached out of the soil. As a result of these circumstances, an application of finely pulverized phosphate rock, for instance, will insure the crop plants an adequate supply of phosphorus for from 5 to 10 years.

—o—

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Managing Editor of Organic Gardening

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organic nature. Next year, these paths will be used for the rows, and the paths will be made where the rows now are. Do you regard this a good organic practice?

H. E. F., Merrick, L. I., N. Y.

A. Since you bury organic wastes between the rows in your garden only after the plants in your garden have made a considerable growth, it may be regarded as a good practice. In no case should the material be buried deeper than a few inches. By the time the garden soil is prepared for next year, the organic matter will be completely decomposed and your soil will be rich in beneficial soil organisms.

—o—

CHLOROSIS

Q. We have been reading and studying Organic Gardening for over a year and are very interested in the organic methods. However, we have never seen any discussion on our own problem, *chlorosis*, so I am writing for some advice.

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The vines try to put on a crop of grapes when the leaves turn yellow and finally fall off. As new leaves appear they suffer the same fate. I found that applications of iron sulphate revives them, but only temporarily. The vines have been richly composted and mulched. What would be your advice?

Mrs. K. C. W., Durango, Colo.

A. Your soil is doubtless deficient in one or more nutrient elements which are necessary for the development of the leaf pigments and the nutrition of the plants. If iron were deficient, chlorosis would appear in the young leaves as they unfold. When potassium is deficient, the leaves turn yellow and develop brown spots which may later develop holes; the fruits tend to ripen unevenly or fall off prematurely. Since it is not clear which element or elements are deficient in your soil, I suggest that you secure some shredded seaweed to add to the mulch around your vines and berry plants. Seaweeds contain quite a number of the trace elements which are so important in plant nutrition.

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